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ABSTRACT

This paper reviews the evolution and implementation of the "Sesame Street" curriculum relating to the development of language and prereading skills. The first section gives a brief history of the Children's Television Workshop, describes the operational model followed by the Workshop in carrying out its initial experiment, and suggests application of the model to future Workshop productions. The second section specifies the language and prereading goals represented in the "Sesame Street" curriculum and discusses the reasons for their inclusion. These goals include improving self-concept, general concept development, and the development of specific perceptual skills. Behavioral goals related to the learning of letters are listed and discussed in detail. The third section describes many of the production techniques and teaching strategies used to implement these letter-learning goals. The problems of sequencing and scheduling instruction for broadcast televisicn are considered. The fourth section provides some preliminary data on the ability of viewers to name certain letters. The evidence suggests that some success has been achieved in teaching letter identification. The final section is a summary. A statement of instructional goals for the 1970-1971 experimental season of "Sesame Street" is appended. (Author/WY)

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*PRE-READING ON SESAME STREET

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TABLE OF CONTENTS

	Pages
INTRODUCTION	1 - 3
CHILDREN'S TELEVISION WORKSHOP HISTORY AND OPERATIONAL MODEL:	4 - 12
Curriculum Development	5 - 7
Behavioral Goals	7 - 8
Measurement of Existing Competence in Target Audience	8
Measurement of Appeal of Existing Materials	8
Experiment Production	9
Testing for Appeal; Testing for Educational Effect	10
Summative Evaluation	12
The Second Season	12
THE LANGUAGE AND PRE-READING GOALS:	13 - 21
Perceptual Skills	14 - 16
Concept and Vocabulary Development	16 - 17
Language Enjoyment and Motivation	17 - 19
Self Concept and Parental Involvement	19 - 20
The Letter Goals	20 - 21
PRODUCTION IMPLEMENTATION	
1. STRATEGIES AND TECHNIQUES	
Humor and Incongruity	22 - 25
Exact Repetition and Repetition with Variation	25 - 31
Participation and Anticipation	31 - 35
Identifying Letter/Sound Correspondences	36 - 41
Identifying Letter Shapes	41 - 57
2. SEQUENCING AND SCHEDULING	58 - 63
THE PROGRESS TESTING	64 - 75
SUMMARY	76 - 78

FIGURES

Figure 1	The CTW Operational Model	6
Figure 2	The Story of Wanda the Witch	27
Figure 3	Three-month Percentage Gains in Letter-naming for Day-Care Viewers and Non-Viewers	69 - 74

PRE-READING ON SESAME STREET[1]

Samuel Y. Gibbon, Jr., Producer, and
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Children's Television Workshop

Television technology, considered here to include the technology of film, has certain unique advantages for education. Not the least of these is the economy of time, talent and money which can be effected by efficient delivery of the instructional package. Of equal interest, but less fully explored, are the teaching strategies and production techniques available for inclusion within that instructional package.

"Sesame Street," the experimental television program produced by Children's Television Workshop, is the product of a deliberate effort to apply the production techniques and entertainment values of popular commercial television to an instructional curriculum for pre-school children, with special emphasis on the needs of the urban disadvantaged child.

The first broadcast season of "Sesame Street" has ended. If follow-up evaluation establishes that the program has succeeded in teaching its target audience, the cost per child will have been extraordinarily low compared with the cost of classroom presentation of a similar curriculum,

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[1] The expanded and revised instructional goals for the second (1970-71) experimental season of "Sesame Street" were developed after the original version of this article had been prepared. They are included in the Addendum.

and the success of the teaching will have resulted from innovative application of the technology.

This paper reviews the evolution and implementation of that part of the "Sesame Street" curriculum which relates to the development of language and pre-reading skills.

The first section gives a brief history to date of the Children's Television Workshop, describes the operational model followed by the Workshop in carrying out the initial experiment, and suggests applications of the model to future Workshop productions. The model provides for a unique collaboration of educational researchers, academic advisors and television producers.

The second section specifies the language and pre-reading goals represented in the "Sesame Street" curriculum and discusses the reasons for their inclusion. These goals range from improving self-concept and general concept development to the development of specific perceptual skills. Behavioral goals related to the learning of letters are listed and discussed in detail.

The third section describes many of the production techniques and teaching strategies used to implement these letter-learning goals. Particular attention is given to the use of humor and incongruity, repetition and repetition with variation, participation and anticipation, identifying letter/scund correspondence and identifying letter shapes. The problems of sequencing and scheduling instruction for broadcast television are considered.

The fourth section provides some preliminary data on the ability of viewers to name certain letters. The evidence suggests that some success has been achieved in teaching letter identification.

Future availability of more extensive data is indicated.

The final section is a summary.

CTW HISTORY AND OPERATIONAL MODEL

The Children's Television Workshop (CTW) was created in March, 1968, to produce a six-month experimental series of daily hour-long television programs which would provide a useful pre-school educational experience for three-, four-, and five-year-olds with special attention to the needs of urban disadvantaged children. The project has been funded by grants from public and private sources including Carnegie Corporation, the Ford Foundation, Bureau of Research of the U.S. Office of Education (in association with Project Head Start and other Federal agencies), the Markle Foundation and the Corporation for Public Broadcasting.

Four essential features of the project are unusual if not unique:

1. the expensive production techniques of popular commercial television are used to teach an educational curriculum;

2. information, promotion and utilization efforts have been far more ambitious than any ever before undertaken in public television;

3. the budget (almost $8 million for the first two years of the experiment) provided for an eighteen month pre-broadcast period of research and development; and

4. program development has been a collaborative effort of producers and a full-time staff of educational researchers.

"Sesame Street" has now completed its first season. The comprehensive follow-up evaluation currently being carried out by Educational Testing Service of Princeton, N.J. will not be completed until late summer of 1970. However, results of progress testing administered by the CTW research staff during the broadcast period and extensive anecdotal reports give indication of some success in achieving many of

the program's instructional goals including those related to language and preparation for reading.

Funds have now been assured for a second experimental season of "Sesame Street." The curriculum will be revised and expanded in several goal areas. For example, additional emphasis will be placed upon pre-reading skills, and a small, carefully selected reading vocabulary will be presented. An effort will be made to teach a small Spanish-English vocabulary, and the program will continue to include more material reflecting black cultural life and language styles.

CTW has been encouraged by its backers to explore the feasibility of a second Workshop series that would focus on reading instruction for seven-to-ten-year olds. Development of this second series will follow closely the operational model established for "Sesame Street." This operational model will be described in some detail, since it has proved useful in harnessing the unique instructional strengths of television.

Figure 1 presents the operational model in the form of a flow chart. It should be noted that the functions of utilization and information have been omitted from the model as it is here depicted. While these activities were essential to the success of the project, they are extraneous to the present discussion of the use of television technology and will not be considered here.

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Curriculum Development. As the initial step toward establishing its educational goals, CTW, in the summer of 1968, conducted a series of five three-day seminars dealing with the following topics:

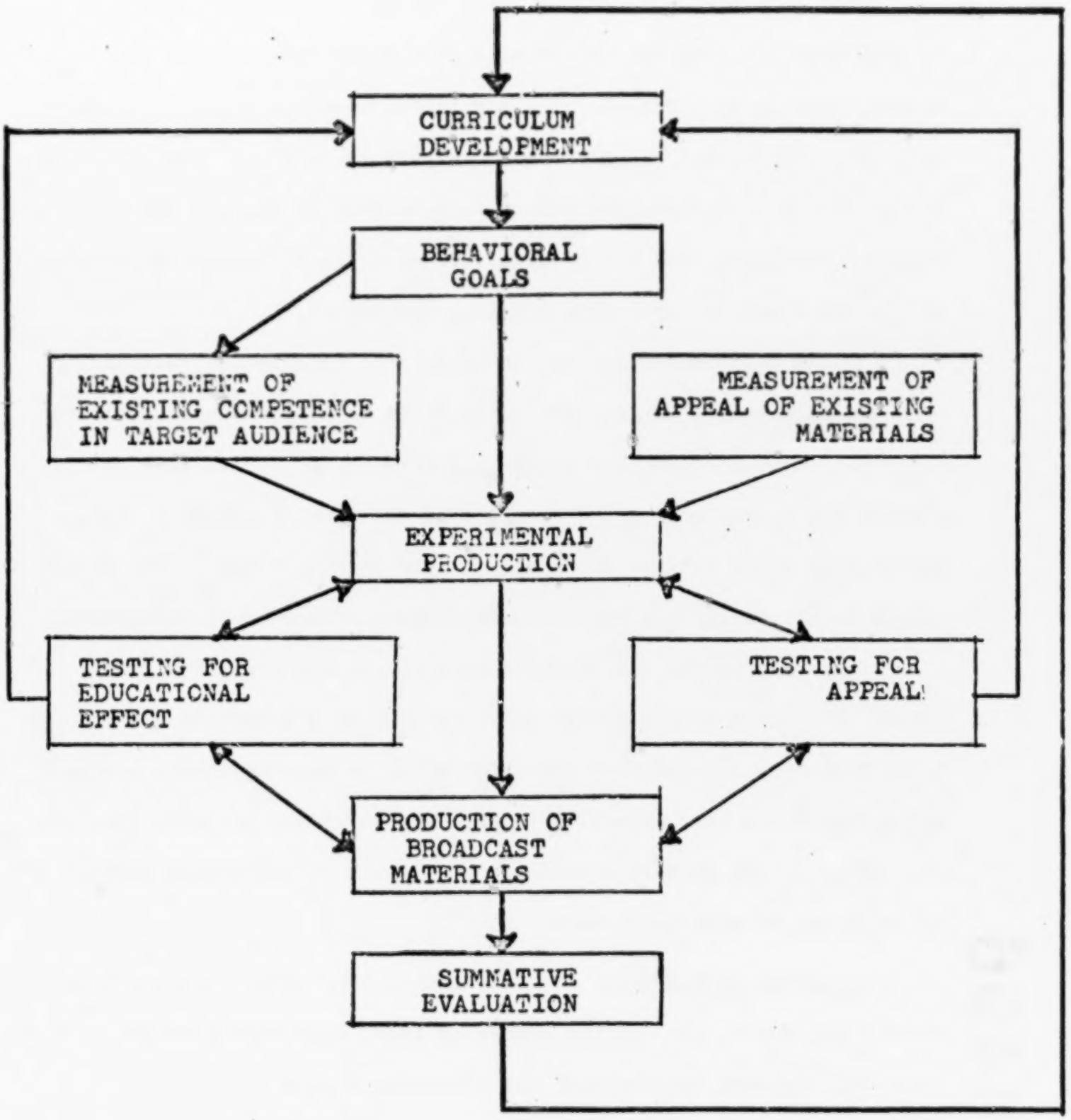


Fig. 1.— The CTW Operational Model.

1. Social, Moral, and Affective Development
2. Language and Reading
3. Mathematical and Numerical Skills
4. Reasoning and Problem Solving
5. Perception

The seminars were attended by more than a hundred expert advisors, including psychologists, psychiatrists, teachers, sociologists, film-makers, television producers, writers of children's books, and creative advertising personnel. Each seminar group was asked to suggest educational goals for the prospective series and to discuss ways of realizing the goals on television.

Behavioral Goals. The deliberations of the seminar participants and the recommendation of the CTW Board of Advisors were reviewed in a series of staff meetings from which a list if instructional goals for the program emerged. These goals were grouped under the following major headings:

I. SYMBOLIC REPRESENTATION
   - A. Letters
   - B. Numbers
   - C. Geometric Forms

II. COGNITIVE ORGANIZATION
   - A. Perceptual Discrimination and Organization
   - B. Relational Concepts
   - C. Classification

III. REASONING AND PROBLEM SOLVING
   - A. Problem Sensitivity and Attitudes Toward Inquiry
   - B. Inferences and Causality
   - C. Generating and Evaluating Explanations and Solutions

IV. THE CHILD AND HIS WORLD

A. Self

B. Social Units

C. Social Interactions

D. The Man-Made Environment

E. The Natural Environment

Specific goals under each of these broad headings were stated, insofar as possible, in behavioral terms so that they might serve as a common reference for the program producers and the designers of the achievements tests. Appropriate coordination of production and evaluation thus was assured.

Measurement of Existing Competence in Target Audience. While the statement of goals specified the behavioral outcomes the program hoped to achieve, it was necessary to ascertain the existing range of competence in the chosen goal areas among the target audience. The Workshop research staff therefore undertook as its initial "formative" research effort a compilation of data provided in the literature, as well as some testing of its own, to determine the competence range. The resulting information helped guide the producers in allocating program time and budget among the goal categories and in selecting specific learning instances in each goal area.

Measurement of Appeal of Existing Materials. CTW to be successful had to capture its intended audience with an educational show whose highly attractive competition was only a flick of the dial away. Unlike the classroom teacher, the Workshop had to earn the privilege of addressing its audience, and it had to continue to deserve their attention from moment to moment and from day to day. At stake was a variation in daily

attendance which could run into millions. The preference of the target audience for existing television and film materials were an essential consideration in the design of the new series.

In response to this urgent concern, an experimental method was devised to measure a child's interest in a given piece of material by continuously recording his visual orientation toward or away from the television screen during the presentation. While this procedure gave no reliable indication of absolute interest in the material tested, it did result in an index of the relative appeal of a broad range of entertainment and instructional films and television programs. Furthermore, graphing the fluctuations in audience interest in a particular program permitted the researchers and producers to analyze the program from moment to moment do discover those elements which were most compelling of attention and those which failed to hold the interest of the sample audience.

Experimental Production. Seminar participants and CTW advisors had urged using a variety of production styles to achieve the curriculum goals adopted. Research had confirmed the appetite of the audience for fast pace and variety. Accordingly, the CTW production staff invited a number of live-action and animation film production companies to submit ideas. "Sesame Street" would eventually include the work of thirty-two different film companies.

Prototype units of all film series produced by or for the Workshop were subjected to rigorous preliminary scrutiny and empirical field evaluation. Scripts and storyboards were revised by the Workshop producers on the basis of recommendations from the research staff; further revi-

sions were made after review by educational consultants and advisors; and finished films were tested by the research department with sample audiences. Some material never survived the process. Four pilot episodes were produced for a live action film adventure series entitled "The Man From Alphabet"; but when the films were shown to children they failed to measure up and the series was dropped. Sample video-taped material went through the same process of evaluation, revision, and occasional elimination.

By July of 1969 a format for the entire show had been devised, a title had been selected, a cast had been tentatively assigned, and a week of full-length trial programs were taped as a dry run.

Testing for Appeal; Testing for Educational Effect. Completed prototype production elements were tested by the research staff in two ways: 1. appeal for the CTW material was measured against the appeal of previously tested films and television shows, and 2. the CTW material was tested for its educative impact under a number of conditions. For instance, field studies were conducted to determine the effect of various schedules of repetition and spacing, of providing the child with preliminary or follow-up explanation, of presenting different approaches to a given goal separately or in combination, and of the relative effectiveness of adult vs. child voice-over narration. Extensive observation of viewing children provided information regarding the child's understanding of various conventions of film and television technique. Upon conclusion of each research study, the results were reported to the producers for their use in modifying the show components tested and for guidance in the production of subsequent elements.

A test showing of the five programs assembled in July, 1959, provided an opportunity to try out the evaluative testing procedures designed by

Educational Testing Service under their contract with the Workshop to conduct the summative evaluation of the initial broadcast season. The programs were broadcast on a UHF station in Philadelphia and shown on closed circuit to a New York day-care audience. The ETS test battery was administered to sample groups both in Philadelphia and in New York, and the necessary refinements of the test instruments were effected. Results from this testing and from appeal testing of the same five shows suggested final pre-broadcast revisions.

The evolution of "Sesame Street" did not end with the first national broadcast on November 10, 1969. Formative research studies conducted throughout the six-month broadcast period continued to guide the development of new production techniques, format elements, and teaching strategies. As before, these studies had two foci: 1. the holding power of entertainment techniques and 2. the effectiveness of educational content.

Earlier and continuing studies of individual program segments, while useful, were necessarily limited in scope. With the onset of the broadcast season, it was not possible to examine the impact of continuous viewing of entire shows over a period of time. Accordingly, the research staff instituted a program of progress testing of the show's effectiveness. Using the ETS instruments, a sample of day-care children, predominantly four- and five- year-olds, was pretested prior to the first national telecast of "Sesame Street." One third was tested again after three weeks of viewing the show, the first third and a second third were tested after six weeks of viewing, and the entire group was tested after three months of viewing. Comparisons between experimental (viewing) groups and control (non-viewing) groups at each stage of the testing gave indica-

tions of strengths and weaknesses both in the execution of the curriculum and in the production design. Appeal measurement and informal observation of viewing children also influenced production decisions during this period.

Summative Evaluation. The summative research and evaluation being carried out by Educational Testing Service follows a plan developed in consultation with CTW staff and advisors. Participation of ETS representatives in all main phases of pre-broadcast planning helped to ensure coordination between program development and follow-up testing.

ETS has developed and is administering a special battery of eleven tests covering most of the major CTW goal areas to a sample which includes children from Boston, Philadelphia, Durham, and Phoenix. The groups include three-, four-, and five-year-olds in urban and rural settings, from middle- and lower-income families, in both home and day-care situations. A special side study relates to children from Spanish-speaking homes. The eleven tests are as follows:

1. Body Parts Test
2. Letters Test
3. Numbers Test
4. Shapes and Forms Test
5. Relational Terms Test
6. Sorting Test
7. Classification Test
8. Puzzles Test
9. What Comes First Test
10. Embedded Figures Test
11. Sesame Street Test

Other measures assess home conditions, parental expectations for the children and the like.

The Second Season. As Figure 1 illustrates, the CTW organizational model is designed to recycle. Results from both the formative and summative research conducted during the first season of "Sesame Street" will influence curriculum and format in the show's second season.

THE LANGUAGE AND PRE-READING GOALS

The participants in the seminar on language and reading quite appropriately considered for inclusion in the curriculum a far wider range of goals than the series could possibly treat. Goals finally adopted were those which appeared suitable for television treatment and which also were thought to offer the greatest potential benefits to the principle target audience of pre-school, urban, disadvantaged children.

Throughout the seminar and later deliberations a balance had to be struck between the ideal curriculum from the standpoint of the child and the subject matter alone, and the ideal curriculum respectful of the larger societal context. Further, a compromise decision had to be made between providing a light exposure to a relatively wide range of subjects and striving to produce mastery within one or two highly limited areas. Arguing in favor of the latter was the important potential for self-concept enhancement resulting from clear mastery, even if over a quite limited domain. Arguing for the former strategy was the risk of under-estimating the child be selecting too simple or too trivial a set of goals. The problem of deciding this issue was complicated by the absence of confident estimates of the medium's instructional potential. The project truly had to be an experiment.

Space will not permit a detailed treatment of each language and pre-reading goal. Accordingly, all the related goals will be discussed in general terms, only those involving the letters of the alphabet will be singled out for more detailed consideration. For further purposes of illustration, and in order to provide a coherent thread extending through all the phases of activity to be discussed, this detailed focus upon

letter goals will extend through the later sections dealing with production implementation of the goals and preliminary results from the achievement testing.

It is possible for convenience to define two main sets of perceptual and cognitive prerequisites for reading, those underlying the decoding process, and those which contribute to comprehension. Among the language and pre-reading goals selected for adoption in the first experimental season of "Sesame Street," there are some which fall into each of these two categories. These will be discussed below, as will some of the criteria used in the selection process. A third main goal area, which can be separated only artificially from the two already mentioned, is motivation of the desire to read. A review of the goals which fall into this important category will also be provided below.

All these goals have significant implications for development of the child's sense of self-worth and competence. Moreover, in displaying his achievement of the skills learned, the child may impress his parents and teachers in such a way as to improve significantly the quality of subsequent interactions with them. These possibilities will also be elaborated upon briefly in the discussion which follows.

Perceptual Skills. The program emphasizes reading prerequisites as opposed to higher order reading instruction such as consonant blends, sight vocabulary, word families, simple spelling and the like. The present emphasis was determined in light of several considerations. First, the target audience of three-, four- and five-year-olds varies widely in readiness for reading. Second, simple prerequisites do in fact exist and there is potential value in attempting to teach them on an experimental basis by way of broadcast television. Third, there was considerable uncertainty, in advance of the experimental season, as to the instructional

potency of the medium. Finally, advisors were frankly apprehensive that approaching more advanced aspects of reading would produce an early and unfortunate resistance to the show within segments of the reading establishment.

Training in visual and auditory perception was included primarily because of the role these skills play later in the decoding of print. Of all the forms in which training in visual perception was presented, the form most closely related to actual reading was that involving the letters of the alphabet. The letters were often presented in such a way as to call special attention to their distinctive features. Examples of the various ways in which this was done appear later in the section on production implementation.

Another way in which the perceptual discrimination aspects of decoding were approached was through training in classification and sorting. In addition to the other functions served by classification, it was strongly recommended for its value in motivating attention to and discrimination of fine details.

A skill considered for treatment partly because it was thought television could treat it well involves orientation to the left-to-right progression in reading. This skill was treated lightly, and by no means systematically, in the first season, but it will be dealt with more extensively in the second.

Other approaches to prerequisite decoding skills were less closely approximate to actual reading. For instance, one of the program's stated goals involves the ability to match a given object or picture to one of a varied set of objects or pictures which is similar in form, size or position.

Another of the stated goals relates to the ability to find the counterpart of a given form when that counterpart is embedded in a figure or drawing. Still another calls for structuring parts into meaningful wholes. In all three of these goal areas, it was recommended that common geometric forms as well as letters should sometimes be involved.

Concept and Vocabulary Development. The Workshop's advisors placed especially heavy emphasis upon the need to include as many useful forms of concept and vocabulary development as possible in the experiment. One reason for this emphasis lay in the contribution such development could make to later reading comprehension. Another reason follows from two broad considerations: first, the overall objective of the program was to provide training which would be useful to the target children in school; and second, the discrepancy between the vocabulary requirements of the school and those of the home is especially apparent in the case of urban, disadvantaged children, who comprise the main segment of the intended target audience.

The areas of vocabulary development singled out for special emphasis in the program's first season fall into three categories. The first includes terms which denote affect states of the individual, such as fun, hope and sadness. The decision to include such terms is supported by the child's need to objectify his emotions: to understand that they exist, that they have names, that they serve many useful purposes.

The second main area of vocabulary development includes terms which denote relationships, particularly those used in making comparisons according to size, position, distance, amount or number, and time. These terms occur with high frequency in the directions and explanations which the child must be able to understand and to produce, both at home and in school.

The final broad area of vocabulary emphasized in the program's goals is that relating to the child's own body and to the physical and social worlds around him. Vocabulary to be taught includes words for body parts and functions, which are important to the child's developing physical self concept. Further vocabulary goals are expressly stated under the headings of social units, the natural environment, and the man-made environment. Vocabulary related to social units include terms relating to occupational roles and to social groups and institutions, such as family and home, city and town, school, and post office. Topics under natural environment include land, sky, water, heat, light, city and country, plants and animals, and processes such as growth and weather. Under man-made environment, the emphasis is upon machines (automobiles, boats, etc.), tools (hammer, saw), common appliances, building and building materials, and such structures as bridges and dams.

Language Enjoyment and Motivation. Nowhere did the nature of the medium bear more clearly upon the determination of the goals for the program's first experimental season than in connection with its possibilities for conveying the fun and enjoyment and the useful functions of language. The traditional entertainment approaches of television were viewed as useful resources for implementing all the goals, but even more obviously, they could be useful when playfulness and humor were an integral part of the objectives, as they were in the area of language. Moreover, television's capacity for control over events and outcomes seemed remarkably well suited to portraying the social utility of language. For example, a character's success or failure in an endeavor could easily be made to turn around the effective use of language, and ineffective use of

language could be made to produce unwanted results.

It was proposed that books be read on the show to establish the pleasure of reading. However, books were to be shown as books, and not as animated television plays; and reading of books, as reading of books. Otherwise, the viewer might fail to make the connection between enjoyment of the story and the act of reading. Story reading would show older persons interacting warmly and constructively with young children, and it would provide opportunities for pointing out the relationship between written and spoken words.

Word play was advocated for the sheer pleasure of it. However, advisors urged the use of one form of word play, alliteration, for its usefulness in focusing attention upon initial letter sounds. Similarly, rhyming was to be used both for fun and as an exercise in auditory discrimination. Wherever possible, the program would capitalize on the child's enjoyment of large words and nonsense words.

Observations made subsequently as a part of the formative research suggest that while three- to five-year-olds enjoy word play, they do not respond well to "play on words." Just as Piaget has found children of this age generally incapable of dealing in dual perspectives in the social realm, or in the perception of ambiguous figures, we have found them generally incapable of dealing with the double meaning of puns. The program employs puns, nevertheless, in order to capture the interest of older brothers and sisters, or parents, who often have control of the television set.

A major objective in using language in its more enjoyable or playful forms was to elicit overt verbal responsiveness on the part of viewing children. Promotion of active participation was considered useful for

many purposes. For one, it would ensure the child's orientation toward the television set and the messages being transmitted. For another, it would interrupt periods of physical passivity. Verbal response could also provide some training in the production of speech combinations not already a regular part of the child's utterances. Finally, verbal participation could promote later recitation, which in turn could help to reinforce any instructional point contained in the material being recited.

Self Concept and Parental Involvement. Throughout the period of program planning, it was always clear that while occasional parental involvement of various kinds could be expected and would be actively encouraged by mounting a major utilization effort at the community level, nothing in the program should be made to depend entirely upon the participation of a parent or other adult.

The decision to emphasize the learning of letters and numbers was based in large part upon the fact that skill in these areas is universally associated with school and school achievement. Alphabet recitation, for example, which was not strongly recommended as a consummative goal, has been taught because it involves subject matter which is finite and can be mastered (with some persistence), because mastery of the subject matter constitutes an achievement which children, with little provocation, will eagerly and proudly exhibit, and because exhibition of the mastery can result in enhancement of the child's own self-esteem and elevate him in the esteem of his parents. Many parents probably do not begin to think of their children as potential school achievers who need early preparation and training without some such provocation.

Wherever possible in the production of the show, an attempt was made to demonstrate through interaction between the live characters, both adults and children, models of constructive communication. For example, the children were shown asking questions as a way of acquiring information, talking through a problem, or simply enjoying the feel and the sound of words. It was decided to introduce varieties of speech forms on the program, including some spoken dialect and considerably informal "street" language, in order to enhance the target viewer's sense of identification with the show, to contribute to the child's self-concept development by implicitly assuring him that his speech pattern was acceptable, and to promote acceptance of speech forms different from his own. For similar, reasons, an expanded presentation of Spanish speech and culture will be designed into the second experimental season.

The Letter Goals. As indicated earlier, the remaining sections of this report will focus on the letter goals included in the "Sesame Street" curriculum. The following list presents the operational definitions of these goals as they appear in the statement of goals for the first experimental season. The presence of an asterisk indicates a higher priority.

*1. Given a set of symbols, either all letters or all numbers, the child knows whether those symbols are used in reading or in counting.

*2. Given a printed letter, the child can select the identical letter from a set of printed letters.

*3. Given a printed letter, the child can select its other case version from a set of printed letters.

*4. Given a verbal label for certain letters, the child can select the appropriate letter from a set of printed letters.

*5. Given a printed letter, the child can provide the verbal label.

6. Given a series of words presented orally, all beginning with the same letter, the child can make up another word or pick another word starting with the same letter.

7. Given a spoken letter, the child can set of pictures or objects beginning with that letter.

8. The child can recite the alphabet.

Corresponding to item 5 in the above list is a subtest in the CTW-ETS Letters Test. This subtest, which includes 16 upper case and 8 lower case printed letters for which the child is to provide verbal labels, is the basis for the data to be presented in a later section.

PRODUCTION IMPLEMENTATION

The first part of this section describes many of the teaching strategies and production techniques used in "Sesame Street" to teach the letters of the alphabet. In each case, related assumptions about the learning process are discussed. Many of the strategies and techniques have been applied to other goal areas in the curriculum as well.

The second part of this section deals at some length with the special problems of sequencing instruction and scheduling instructional materials on broadcast television and describes the way in which these problems have been dealt with on "Sesame Street."

STRATEGIES AND TECHNIQUES.

It will be evident that many pieces of material described below use combinations of the strategies and techniques separated here for purposes of analysis. Moreover, a deliberate attempt has been made wherever possible throughout the show to treat more than one goal category in a single segment, and some of the illustrative examples given will reveal that effort. Conversely, many show segments principally concerned with other curriculum goals, and therefore not mentioned here, introduce letters or printed whole words incidentally.

Humor and Incongruity. The reliance on humor and incongruity throughout "Sesame Street" is sufficiently evident in the program segments described below as to require no additional illustration here. Because the use of humorous incongruity is so pervasive, however, some attention will be given to the reasons for its adoption as an educative tool.

First, children enjoy humor and incongruity, and the program had to entertain in order to attract and hold its audience. Furthermore, verbal humor helps hold the interest of older siblings or parents who often control program choice.

Second, humor is a helpful motivational device. Associating the learning of a letter with a funny character or situation makes the learning fun and perhaps easier to remember. However, humor must be used with care, lest it compete with the instruction and the child remember the joke, but not the learning with which it is associated. Comedy has been most successfully used in those "Sesame Street" segments in which the comic moment coincides perfectly with the most critical learning opportunity.

Third, as has been indicated above, advisors urged that the program communicate the pleasure of playing with language, and the emphasis on verbal humor in "Sesame Street" is designed to promote this pleasure. Anecdotal evidence suggests that several catch phrases used repeatedly for comic effect have been widely picked up and repeated by the audience: Buddy's line, "Heeeeeey Jim! for example; "Cookie!" repeated in gutteral tones by the voracious monster puppet who plagues Ernie and Kermit the Frog; or the insidiously soothing "Riiiiight!" uttered so persuasively by the mysterious salesman puppet who tries to sell Ernie everything from fresh air in a bottle to the number 8. In addition to being fun to repeat, such phrases call attention to the idosyncratic nature of spoken language and the social purposes to which it can be put.

Fourth, humorous incongruity attracts attention. Much of the comedy

material on "Sesame Street" is designed to be repeated. During his first exposure to the material, the child may be lulled into inattention because he expects a predictable conclusion; an incongruous pay-off. Given enough repetitions, the first picture or sound will alert him to expect the unexpectedly funny conclusion.

One strong use of humorous incongruity occurs in a series of short animated films produced to teach counting to ten, or rather counting backwards from ten. In these films an identical situation results in a variety of comic endings. The situation is a countdown to a rocket blastoff. The launch director counts off the seconds in a solemn voice as a surrounding group of dignitaries waits expectantly. The numbers appear at the top of the screen as the count progresses.

In every film but one, something catastrophic happens to embarrass the launch director: the rocket blasts off prematurely leaving the charred launch director sheepishly completing the countdown for his disgruntled audience; the rocket blasts off at the right moment but in the wrong direction, and disappears into the ground; the launch director himself blasts off, his panic-stricken count of "Oooooone!" fading in the distance, and so on.

To the naturally suspenseful situation of the rocket countdown is added the additional suspense of waiting for the disastrous pay-off. The child's attention is thus drawn compellingly to the number sequence being taught.

The one exception to the otherwise consistently castastrophic launches is a successful launch which is greeted with cheers and waving of banners. This straight version itself becomes comic. The viewer has come to expect

incongruous disaster, in what precise form he cannot anticipate; he is now further surprised by incongruous success.

This device of varying the comic incongruity resulting from an identically repeated situation was not applied to the teaching of letters in the first season of "Sesame Street"; but letter films now in the planning stage for the second season will take advantage of its attentional virtues.

Exact Repetition and Repetition with Variation. The effective advertising commercial has much to recommend it as an educative device: it is short, uses speech economically and production values maximally, makes use of musical jingles, rhymes and slogans, and it is designed for identical repetition. "Sesame Street" has deliberately copied the commercial form in much of its letter instruction. In fact, the short animated films designed to teach letters are referred to by the Workshop staff as commercials.

Imitation of the model has been carried still further. The announcements of sponsor identification at the beginning and end of commercial programs are called "commercial billboards." "Sesame Street" has used the billboard format to recap at the closing of each show the letters and numbers taught that day. An off-camera voice announces, "'Sesame Street' has been brought to you today by the letters, A, B, and X, and by the numbers 3 and 4." In synchronization with his announcement, the corresponding capital letters and numbers are matted over the picture of the set. (A matte is a type of superimposition in which the image matted replaces that part of the background image over which is superimposed.)

Exact repetition of animation films, live action films and video-taped segments has been a highly visible feature of the instruction in all goals

and categories on "Sesame Street." It is assumed that the letter commercials benefit from a rehearsal effect in much the same way that advertising commercials do. Given sufficient repetitions, the child viewer begins rehearsing, away from the viewing circumstance, whatever part of the sound track he can and chooses to remember. This rehearsal constitutes reinforcement of the learning load carried by the sound. If repeating the words also calls to mind the associated pictures, the reinforcement, it is assumed, is still stronger.

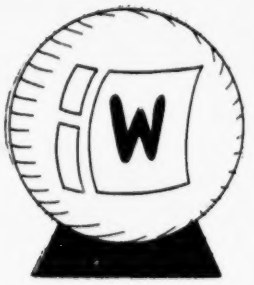
Another assumption regarding the effect of exact repetition will be discussed at greater length below. For the moment, it will suffice to observe that while a film may be repeated a number of times without change, it is probably experienced differently each time. Given careful design of the film exact repetition ought to enhance the child's ability to integrate conceptually a set of elements and relationships too numerous or too complex for him to grasp in a single viewing.

Repetition with variation is assumed to be one of the most powerful of the teaching strategies used. It appears on "Sesame Street" in two forms: 1) content constant, format varied; and 2) format constant, content varied.

The first form was the more widely used. Varying the format while keeping the subject matter constant was thought to promote generalization of learning. The letter "W", for example, was the subject of three different animated films, including the story of "Wanda the Witch" (illustrated in Figure 2 below), four different segments video-taped for repetition, and a number of spots using the live characters on the street. While the style

The Story of...

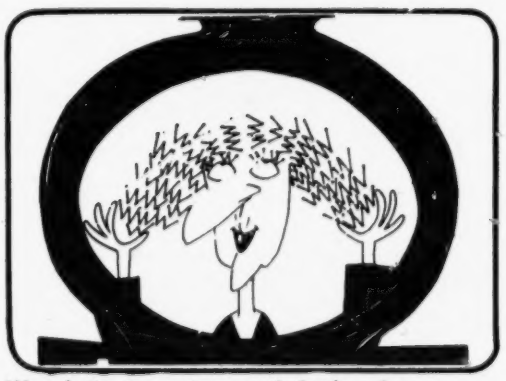
Wanda The Witch



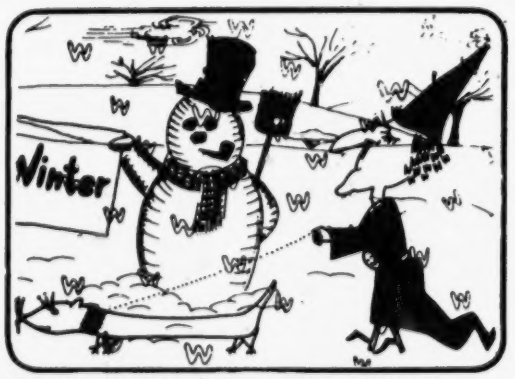
This is how "Sesame Street," the new daily TV series for preschool children, teaches one of the letters of the alphabet. Cartoonist Tee Collins and Anne Bower, associate producer at the Children's Television Workshop, collaborated in the creation of this catchy, 60-second animated cartoon which not only introduces the shape of the letter but uses many words which employ the sound as well.

Wanda the Witch lived somewhere west of Washington.

Around her waist instead of a belt she wore a worm.



Wanda had a pet weasel. And on her head a wiry wig.

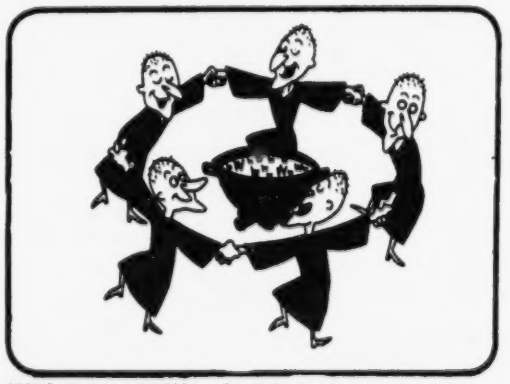


One Wednesday in the middle of winter, Wanda walked to the well to get water to wash her wig.

But the wheel on the well was worn and Wanda grew weary.

So she waved her wand and her washtub filled with warm water.

But just as Wanda dropped her wig into the warm water, a wild wind whipped the wig from her hands and blew it away.



Which taught Wanda this lesson: witches who wash their wigs on windy winter Wednesdays are wacky.

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Fig. 2.—The Story of Wanda the Witch.

of type remained quite constant throughout, "W" appeared sometimes as a three dimensional object, sometimes as a line drawing, sometimes as a cardboard cutout, etc. It was hoped that the distinctive features of the letter would emerge from these variations of irrelevant attributes.

Varying the content while keeping the format constant was intended to promote literacy of convention and to convey the usefulness of a particular strategy of inquiry or structured set. One visual convention that saw heavy use was the speech balloon familiar to comic strip readers.

Ten- to fifteen-second animated films, called "balloon bits," were made for each letter of the alphabet except "Q." In these films, a character, different for each letter, appears against a plain white background. The character pronounces the name of the letter, a word beginning with that letter, and the name of the letter again. As the letter name is spoken, a balloon emerges rapidly from the character's mouth and the letter in its lower case form appears within it. As the work is spoken, its remaining letters also appear in the balloon. The balloon now assumes life independent of the character who produced it, who is now helpless to control the action that takes place within it.

Within the balloon, the word forms into the object it names or dissolves into a scene illustrating the use of the word. A quick visual gag ensues, generally involving the original character, and the scene within the balloon then dissolves back to the letter as the character pronounces it the second time.

The word used to illustrate the use of the letter "a," for example, is "ape." The printed word dissolves into an animated ape, who strums

a ukulele and sings in a high falsetto the first phrase of "Tiptoe through the Tulips." The ape disappears, "a" reappears, and the original character, who has been observing the spectacle, turns to camera with a quizzical expression and says, "a?"

Repeated use of the balloon convention has motivated and conceptual advantages. First, recognition of a convention whose previous use has been amusing creates a pleasurable anticipation for its subsequent use. Second, if a previous use of the convention has contributed to mastery of the content, similar success with the new material will be anticipated. Third, the speech balloon is such a strong symbol of the correspondence of print to speech that that concept may be communicated without direct didactic reference. Fourth, while twenty-five different letters and the same number of different words are presented through the use of this convention, only letters and words are presented. Thus, the convention serves to group into a class the symbolic material it presents.

Another format convention has slightly different advantages. Sorting and classification skills have been taught by means of a game involving the viewer at home. A card divided into quadrants shows three identical drawings and a fourth drawing which is different. One of the show characters stands next to the card and sings a song that gives the rules of the game: "One of these things is not like the others/One of these things just doesn't belong...." At the end of the chorus, the screen fills with a shot of the entire card. Instrumental music continues while the child at home attempts to select the picture which doesn't

belong with the other three. The correct choice is then indicated in a second sung chorus, and at the end of the song the difference is carefully pointed out.

Repeating the same song and the same visual context each time the game is played, but varying the content of the quadrants on the card, has, presumably, the same motivational advantages as those enjoyed by the convention of the speech balloon. In this instance the concept of classification, and the importance of fine discrimination to its successful exercise, are the instructional freight carried by the convention. Frequently the drawings to be discriminated are letters, or letters and a number.

There are variations within this particular format convention. The card can show three drawings which are similar in some attribute, but not identical, and a fourth drawing which does not share the attribute. Sometimes three different members of a class of objects are shown together with a fourth object outside the class. When the game uses these variations, every component of the convention remains the same except the song.

The melody of the second song is markedly different, and the lyrics suggest a subtle difference in the task to be performed: "Three of these things belong together/Three of these things are sort of the same...." Here the problem, and the explanation at the end of the game, is more complex. The task is still one of discrimination and classification so the major characteristics of the convention remain unchanged. If the song were not changed, however, the viewer might try to apply the strategy he had used previously to find the drawing which was not isomorphic. The

resulting confusion would reflect doubt back on the previously successful strategy, and the motivational value of the earlier mastery would be lost.

There are perils inherent in a no-feedback situation like broadcast television and one of them is illustrated by a particular use of this last convention. On one program, the card showed three different letters and the number "3." At the end of the game Susan took pains to point out that the "3" was different because it was a number while the other three were letters. What nobody noticed was that two of the letters were constructed entirely of curving lines, like the "3," while the third letter had only straight lines. This difference, perhaps the most salient for the pre-school child, escaped all the symbolically oriented adults through whose hands the script passed, until the father of a distressed four-year-old wrote to point out the error.

Participation and Anticipation. It was assumed that any overt verbal or motor response to the program on the part of the viewing child was indicative at least of enjoyment and involvement, and at best of learning reinforcement. The rehearsal effect mentioned earlier is itself reinforced whenever the viewer attempts to sing or talk along at the time the material is shown. Sufficient repetition of any unchanged program element could theoretically produce such attempts at participation, and observation confirms that many children try hard to sing or talk along. Participation of this kind is always encouraged

on the program, either explicitly by direct invitation or implicitly by unaltered repetition.

The absence of feedback in television affects the manner of elicitation and the nature of overt viewer response. Certain restraints must be exercised in reacting to a supposed response, for example. Congratulating the unseen audience for correctly completing a task may confuse the child who has not found the solution or has confidently chosen an incorrect solution.

On the other hand, television is non-punitive; however urgent the implicit or explicit invitation to participate or react, the child can decline the invitation with no fear of punishment or, indeed, of attention of any kind. This may result in less frequent or less enthusiastic response from the secure child, but it may encourage the less confident or less successful viewer to try again.

The ability to recite the alphabet is a relatively trivial skill. It was included among the letter goals chiefly because it could become a badge of competence for the child who mastered it. Despite its low priority, however, alphabet recitation accounted for approximately four hours of the 130 hours of program time in the initial season, three times the attention given any individual letter. The alphabet was recited at least once in every show.

The reasons for this apparent disregard of goal priorities were as follows: first, assuming inconstancy of viewing, it seemed important to identify all the letters in each program, lest any child be mislead to believe that the incomplete set he had learned were all there were

to learn; second, it was assumed that motivation to learn all the letters would be enhanced by the knowledge that there was a limit to the task; third, by presenting the letters visually as their names were rehearsed, recitation of the alphabet constituted a review of letters already identified and a preview of those yet to be taught; fourth, presentation of the alphabet might provide a useful opportunity for the viewer to discriminate between visually and aurally confusable letters; and fifth, reciting the alphabet was a natural occasion for the type of overt participation sought throughout the series.

The traditional alphabet song was sung live on several occasions during the first six months, usually with children on the set joining in. On these occasions, the child at home was asked to sing along. The same song has been used with less success in an animated film. This film shows a little girl who walks out on a stage, apparently for an audition. An off-camera voice, presumably that of her mother, tells her when to sing and corrects her delivery during the song. The letters appear on screen as the child sings.

The film seemed amusing to the Workshop staff, and it tested well for audience appeal. However, when children were observed watching the program over a longer period of time, it was found that the film frustrated many of them. Children who had already learned the alphabet song and wanted to sing along found the interruptions confusing. The rhythm of the song was broken and the off-stage comments were distracting. Those who were still struggling to learn the song found the film difficult for the same reasons.

Perhaps the most interesting and successful treatment of the alphabet on "Sesame Street" is its recitation by James Earl Jones.

The appearance of celebrities on the program had been actively solicited from the beginning in an effort to publicize the show and glamorize its content. Some celebrities, Batman and Robin, for example, were enlisted because of their authority with the four-year-old. Others not so familiar to the pre-schooler, like Burt Lancaster and Lou Rawls, were used to give the show an aura of importance in the eyes of the older sibling or parent who might dictate program selection at "Sesame Street" time. James Earl Jones was one of the first celebrities to offer to help.

Mr. Jones' recitation of the alphabet takes a full minute and a half. He stares compellingly at the camera throughout. His shaven head gleams in the closeup. His immense hollow voice booms the letter names ominously. His lip movements are so exaggerated that they can easily be read without the sound. The performance should be seen by every actor who ever complained about his lines.

As Mr. Jones recites the letters, they appear on alternate sides of his head. Each letter appears visually for a moment before it is named. Once named, the letter disappears, and another brief pause ensues before the next letter appears and is named.

So powerful is Mr. Jones' presence that some staff members were concerned that very young children might be frightened. Observation of viewing children established the contrary. Further observation confirmed the presence of what one author of this paper has termed the James Earl Jones effect.

This effect actually appears to be a three-stage sequence of effects. The first time a child sees the Jones performance, he begins almost at once to respond to the implicit invitation to say the alphabet along with the performer. On somewhat later repetitions he begins to name the letter as soon as it appears, before Mr. Jones has named it. Mr. Jones' naming of the letter then confirms or corrects the child's identification of it. With still further repetition, the child begins to anticipate the printed symbol as well. As soon as the preceding letter disappears, the viewer names the next.

The effect is significant because it demonstrates the feasibility of simulating with the one-way medium of television, the feedback and reinforcement so instrumental in learning. The instruction is clearly individualized, even though it there appears to be but a single, one-way message involved.

This phenomenon has been observed only in day-care viewing situations where a group of children are viewing together. Under these circumstances, competition is an active motivational goal. However, it would be surprising if the same effect were not observed to occur, albeit less predictably, in the case of a single child viewing at home alone.

The value of the James Earl Jones effect in learning the letters of the alphabet led the producers to try to induce it deliberately. When Pat Paulsen volunteered to perform, he was asked to recite the alphabet but with several hesitations, as if unable to remember the next letter. The sequence and timing of the performance are roughly

the same as with Mr. Jones: letter appears, pause, letter is named, letter disappears, pause, next letter appears, pause, etc., until Mr. Paulsen falters. At this point, the letter matted next to his head flashes several times to remind him; Mr. Paulsen sneaks a quick look, names the letter in happy relief, and goes on.

Identifying Letter/Sound Correspondences. Direct teaching of individual letter/sound correspondence was used only occasionally on "Sesame Street" in its first season. More often the sound of a letter has been illustrated by giving examples of words beginning with that letter allowing the child to infer the rule of correspondence from its many alliterative applications. Furthermore, on those occasions when individual letter sounds have been taught, the instruction has always included examples of the occurrence of the sound in whole words. Whenever possible, words used to illustrate letter/sound correspondences have been visually presented as well. The viewer is thus constantly reminded that the correspondence of a single printed letter to an isolated speech sound is of significance only in terms of the broader and more important correspondence of the printed word to its spoken counterpart.

Letter teaching embodied in films and video-taped segments is almost invariably reinforced by the human and puppet characters on the street, either by preliminary lead-ins designed to provide a learning set for the segment to follow or by further illustrations of the letter's use in words immediately subsequent to the segment. The illustrative words are matted on the screen synchronous with their pronunciation. The majority of these matted words use lower case letters only. The initial letter appears in

a bright color to set it off from the other letters in the word. Such phrases as "Without (letter) you couldn't spell (word beginning with the letter)" serve to emphasize the functional necessity of letters and to remind the viewer that learning letters is a necessary step toward learning to read whole words. Story reading has provided other opportunities to relate letter learning to learning to read.

Animated letter commercials reveal the same intention. In a film about the letter "S," for example, a circus seal, invites the audience to listen to the sound of the letter and then make the sound of the letter with him. He points out that the letter is used in many words and urges the audience to listen for the "S"-words in a story about six silly sailors. The words illustrating the use of the letter in the initial position appear on the screen as they are pronounced in the story.

Bob issues a similar invitation to the viewer in his introduction to the story of "Ira and Inez." This segment and others like it are whimsical alliterative fables enacted by puppets with interspersed narration read by one of the human characters. In these fables, the many words beginning with the featured letter are not shown visually because of the strong visual competition from the puppet action.

Both "Ira and Inez" and the animated "S" film described above carry alliteration to the point of comic exaggeration. This device has been heavily relied upon in "Sesame Street" in order to focus pleasurable attention on the initial sound of the letter to be taught. It is assumed

that post-initial word sounds are filtered out as noise, and the alliterated sound is recognized as the signal to be heeded.

Since comic alliteration on "Sesame Street" is applied to many different initial letter sounds, the device functions as a verbal convention enjoying many of the advantages accruing to visual conventions. Recognition of the convention should assist the viewer in transferring his ability to infer letter/sound correspondence to subsequently taught letters. Repetition of alliterative material invites the child to participate verbally and, once the convention has been learned, to rehearse away from the viewing situation not only the words learned from the sound track but the convention of alliteration itself.

Figure 2 shows portions of the script and selected frames from one of the three animated films produced to teach recognition of the letter "W" and its associated sound. Included in the film, but not in Figure 2, is a brief section at both beginning and end in which the witch uses her wand to write a letter "W" as an off-camera voice announces: "This weird story of Wanda the Witch is brought to you courtesy of the letter 'W'." The story includes fifty repetitions of the sound of initial "W" in one minute and sixteen seconds. The female narrator employs a harsh, penetrating vocal quality, appropriate to a story about a witch and apparently amusing to the children observed watching the film. It is also extremely effective in making salient the sound of the letter "W."

The film is done almost entirely in black and white. As Figure 2 reveals, many of the "W" words used in the narration are printed on the

screen in synchronization with their pronunciation on the sound track. What is not clear in Figure 2 is that whenever one of these words appears, it is printed in a variety of vivid colors. This device serves to call attention to the words and also to set apart the use of "W" in words from the many other "W's" scattered through the drawings. Children watching this film through a number of repeats evidently enjoy discovering these miscellaneous "W's," in the witch's wig, for example.

The story of "Wanda the Witch" was repeated fourteen times during the six months of the initial season of "Sesame Street," eight times during the three months of broadcast preceding the testing reported below. Twice during the six months, and once during the first three, it was associated with a pair of puppet segments, yet to be discussed, in which alliteration figured prominently.

Rhyme has also been used extensively, but perhaps less effectively. Early formative research indicated that children attempting to speak or sing along with the sound portion of the program attended to and remembered rhyming words early. They tuned in quite readily to the pattern of auditory analogy. Eventually, with repetition of the rhymed material, the gaps between the remembered rhyming words were filled in, and many children could successfully chant the entire jingle of a minute-long film as it was presented. As an enjoyable mnemonic device, therefore, rhyme has been used to good effect.

Often, however, the rhyme scheme of a jingle competes with alliteration for the child's attention; and in this circumstance rhyme appears

to win, at least temporarily. The very first animated film commissioned by the Workshop for "Sesame Street" was a one-minute "commercial" for the letter "J." The story begins, "Once upon a time a guy named Joe/ Noticed a Junebug on his toe;/ Put it in a Jar and started to go,/ When along came the Judge and said 'No, no, no.'" Although every "J" word appears on the screen as it is spoken, the children with whom this film was tested were at first more aware of the rhyming pattern than they were of the pattern of alliteration.

Any verbal convention which induces the child to attend closely to spoken sounds seems a useful instrument for training in auditory discrimination. In this sense, the "J" commercial can be educationally beneficial even if the viewer misses the main point. For the four year-old, certain patterns of spoken language have yet to be mastered, and exactly repeated presentation of verbal puzzles can provide an opportunity to explore these patterns.

A given child may never discover the main point of the "J" commercial. He may feel he has achieved success when he has learned all the words of the jingle by heart and may not move on to discover the alliterative pattern of "J" words. On the other hand, it is possible that once the jingle has been learned, the child will attend to other features of the film, for example the appearance in print of words beginning with "J." This discovery may lead him in turn to discover the auditory pattern which coincides with their appearance.

It may never be possible to determine fully what happens in the

mind of a child watching television; but it is likely that one reason children are fascinated by exact repetition in the medium is that it permits them eventually to explore all the facets of a multi-sensory experience.

Identifying Letter Shapes. Many strategies, both analytic and synthetic in character, have been employed to teach the distinctive features of letters. They include drawing the letter in various ways, assembly of the letter from component parts, calling attention to analogous shapes of real objects, searching for the shape of the letter embedded in the environment, juxtaposition of confusable letters, synesthetic description of the letter form, and personification of the letter permitting dramatic involvement of its distinctive features. The techniques employed to present letter shapes include some that are unique to television and film technology.

One technique, by no means unique to television, consists simply of drawing a letter to show its peculiar shape to a watching child. "Sesame Street" performers of all kinds, adult humans, children, muppets, and animated characters have drawn individual letters from time to time. Presumably, seeing the skill practiced encourages the child to try his own hand.

"Sesame Street" also made use of opportunities not available to the classroom teacher, however. In animated film, letters can form as if by magic, and several films produced for the program took advantage of the fact. In one, a ball thrown by a little girl bounces between ruled lines drawn across the screen, leaving a visible path in the form of the letter "M." This particular sequence presented a problem. On

the recommendation of advisors, the Workshop had imitated as closely as possible in all its letter presentations a manuscript alphabet widely used in first grade. However, the specified order in which the elements of upper case "M" are to be drawn was not followed in the animated sequence in question. The ball had to form the "M" continuously in order not to violate the premise that it was bouncing between the lines. The specified manuscript order calls for the two vertical members to be drawn first in separate strokes, and then for the middle members to be drawn, also in separate strokes.

Ensuing discussions with the advisors had to weigh the competing demands of educative consistency and dramatic necessity. It was concluded that while the manuscript model was widely used, it was not observed with total fidelity, that the main purpose of calling attention to the structure of the letter would be served even if the model were not copied faithfully, and that the animated sequence had sufficient value as entertainment to warrant departing from the prescribed order of formation. Such minute attention was not given to every instructional detail in "Sesame Street," as many sharp-eyed teachers have pointed out; but, whenever the pressures of production deadlines permitted, material was given scrupulous review.

A second variation on letter drawing shows letters produced by a skywriter. One of the original "Pepsi-Cola" pilots was hired to write a number of letters in the sky over Asbury Park, New Jersey, and his efforts were filmed with considerable difficulty. These films have been

integrated into the live portions of the program in such a way as to make it appear that the adults and children on the street set are actually seeing the letter being written over their heads. As the shape of the letter evolves, the children try to guess what it will be.

Since the skywritten letters are formed in the order called for by the manuscript model, the most distinctive elements of the letters are not necessarily the first ones drawn; however, the exercise of gradually reducing the number of possible letters presumably contributes to the viewer's capacity to attend to their critically differentiating features. This production technique has an inherent suspenseful uncertainty which motivates the viewing child to attend closely to the evolving form in an effort to anticipate the completed letter. The motivation is heightened by a sense of competition with the child actors on the program. Assuming that the viewer does make a guess at the ultimate letter, the technique has the virtue of immediately confirming or disconfirming his prediction.

Letters have been constructed on "Sesame Street" in ways other than drawing. On several occasions a magnetic board has been used to assemble a letter from various geometric forms or from straight and curved strips. One manner of assembly uses a television technique particularly attractive to children. Formative research had established that an animation technique called "pixillation" rated extremely high on appeal. The technique consists of filming live actors a single frame at a time. The result is an incongruous combination of the

magical properties of cell animation and the antics of actual human characters in natural settings. A recent series of ads appearing on commercial television uses the technique to make it appear that an actor sitting on the pavement and holding a steering wheel is driving himself down the road on nothing more locomotive than the seat of his pants. Pixillation has much in common, both in appearance and appeal, with speeded-up and slow-motion film and with film run backwards. Current video-tape technology makes similar effects possible in the television studio and "Sesame Street" used a form of pixillation in several video taped segments involving two regular members of the live cast.

Bob and Gordon appear in a limbo setting, each carrying a part of a huge three-dimensional letter. Through grotesquely inaccurate trial and error, accompanied by silent movie chase music, they discover the correct fit. Each of these segments is presented in context with the other teaching of the letter shape, so the viewer will have little difficulty in seeing the errors. Suspenseful attention to the comically incorrect assemblies should help the viewer fix in mind the correct letter form.

One film, produced for other instructional purposes during "Sesame Street's" first season, employs a technique which is currently being applied to a series of letter films for the second season. In the original film, a group of unseen children are heard giving instructions as to how to draw an elephant. The artist is in effect the television screen itself, since the lines appear as if of their own accord. The

film constitutes a gradual refinement of the drawing from a form which is absurdly un-elephant to one which is quite unmistakably elephant. The children's comments and instructions are entirely spontaneous, and their urgency increases with the succession of mistakes in the drawing. The technique seems admirably suited to teach discrimination of letter forms.

The beginning and end of the so-called "J" commercial, discussed earlier with reference to its use of rhyme and alliteration, illustrates another technique used to fix a letter shape in the viewer's mind. At the start of the film, two boys are invited by an unseen narrator to watch a story about the letter "J." A large upper case "J" descends between them. One of the boys remarks that the "J" looks like a fish-hook. The voice of the narrator intones, "It's not a fishhook, it's a 'J'." At the end of the story, the second boy says, "So that's the letter 'J'." The first boy replies, "It still looks like a fishhook to me."

In noting the similarity between letter forms and the shapes of commonplace real objects, the familiar is used as a bridge to the un-familiar. The new knowledge is thereby made more accessible and more memorable. Similar shape analogies have been drawn for other letters. "Y," for example, has on separate occasions been likened to a fork in the road and a branching trunk of a tree.

The most accessible of familiar objects are parts of the child's own body. Using the fingers to make letter shapes provides the child with a physical analogy always available to him and introduces a

kinesthetic dimension into letter learning. At various times characters on the program have used their fingers to make "U", "V", and, by putting two "V's" together, "W." Observation of children watching these show segments has established that the viewing child is drawn irresistibly to imitate the performers.

Pointing out analogies between familiar shapes and the shapes of letters is closely related in its effect to the search for letter forms embedded in the real environment. In one "Sesame Street" segment a puppet finds the letter "E" repeated in the structure of a door, and in another, "T" is discovered embedded in the railing around the basement windows of the apartment house. When such embedded letters are found, a cutout letter is matched to the embedded letter to confirm the presence of the embedded form for the child who may not have seen it. The search for embedded letters is, of course, an exercise of wider significance, since it provides training (1) in perceptual decentration by implicating a given object first in the category of letters, and then in the framework of a physical structure; and (2) in distinguishing signal, or relevant characteristics, from noise.

Both of these related activities implicitly invite replication by the child after the program ends. The child is thus provided with a method of extending and reinforcing learning on his own.

During the last two weeks of the initial season, an effort was made to confront directly two special sources of difficulty in letter learning: the confusability of certain closely similar letter forms, and the dis-

similarity of upper- and lower-case forms of certain letters. Confusable letters were presented in the following upper-case pairs: U/V, F/E, R/P, H/A. Upper- and lower-case pairs presented were: I/i, D/d, B/b, R/r, Y/y. It was assumed that by bringing into contact pairs of potentially confusable letters previously presented separately, the confusion could be generated and resolved, and that once the confusion had been resolved, recognition of each letter of the confusable pair would be strengthened.

Similarly, it was felt that the viewing child would become likely to notice the connection between the differing upper- and lower-case forms of a letter if the connection were explicitly stated. Upper- and lower-case versions of all the letters had been presented in the course of the series, occasionally paired without particular comment, but more often independently of one another. It was believed that this relatively indiscriminate approach could be more confusing than deliberate pairing. This direct teaching, however, was done with inventiveness and humor. Oscar the puppet, irascible denison of the trashcan, harangues his audience furiously about the difference between the letter "R," which has two legs, and the letter "P," which has only one. Big Bird becomes hopelessly confused when the bottom line of an "E" drawn on the blackboard mysteriously migrates to a neighboring "F", making an "E" out of the "F" and an "F" of the original "E." Big Bird also finds himself involved with frisky matted "R's," upper- and lower-case, which pose for him while he draws them on the blackboard. A rapid-fire sequence alternates "U" and "V" in a series of quick sight gags.

A preliminary field study designed to measure the effect of the program's teaching pairs of confusable letters has proved inconclusive, but

results suggest at least that pre- and post-tested children who watched these programs did not suffer loss of letter learning. Absence of an adequate control group makes it difficult to determine whether the apparent gains among the viewers can be attributed to the letter pairing. Further research will be necessary to establish the effect of the instruction.

In many show elements an attempt has been made to use cross-modal reinforcement of letter shapes. In these segments the primarily visual experience of letter formation is supported by music or sound effects appropriate to the action, as, for example, in the "M" film described above. Here, the action of the bouncing ball that forms "M" is punctuated by "boings" which focus attention on the bounce points, the outer limits of the letter elements. The ruled lines which contain the bounces correspond, of course, to the lines on the paper the child will encounter in school when he first learns to write. This may mean little to the preschooler at the moment, but it is possible that the experience of the film will return in some fashion to help him when he first meets the discipline of the manuscript lines. If so, the synesthetic sound effects will have been partly responsible.

Observation of children watching the Big Bird "E"/"F" sketch described above reveals interesting effects, the first related to the earlier discussion of letter drawing and the second to the use of synesthetic sound.

All the observed children were highly attentive at the beginning of the scene when Big Bird painstakingly drew the two letters. Once Big

Bird's letters were complete, however, interest fell off markedly. When the line at the bottom of "E" began its magical move over to join "F," the visual attention of all the observed children returned at once to the screen. What called them back was the slide whistle sound effect that accompanied and matched in quality the jerky movements of the line as it sought its place.

Because of the sense of comic physical movement conveyed by the sound of the slide whistle, it is widely used in film and television slapstick comedy, and especially in cartoons. The children who had lost interest in the Big Bird sketch evidently recognized this synesthetic sound, associated it with comic fund and snapped back to full attention.

This behavior was observed consistently during pre-broadcast formative research. Children apparently have a finely tuned ear for material appropriate to their interests. An adult talking adult-talk will cause the child to turn his attention away from the set. He appears, however, to continue some auditory monitoring, for as soon as any auditory cue, such as the inherently comic slide whistle, suggests the imminence of potentially interesting program material, he will refocus his visual attention on the screen.

Once the attention of the viewing children had been brought back to the Big Bird segment, it continued to be held by the peregrinations of the magic line and the accompanying slide whistle. Some children imitated the sound associated with the line. The sketch succeeded in making the letter element which distinguishes "E" from "F" the center of dramatic interest and did so, at least in part, through the use of

arresting synesthetic sound.

Another type of synesthetic reinforcement is used in one of the two puppet segments to be quoted in their entirety below. Kermit the frog describes a letter "N" as having "three lines." "Zap! Zap! Zap!" Even without accompanying gestures - Kermit's manual capabilities are limited - the words are curiously appropriate to the shape they describe.

Letters frequently have been personified on "Sesame Street," either by endowing them with a magical life of their own or by building stories about them. An example of the latter technique is a story Bob tells about the little "b" who wants to play with his big brother "B." Cutout letters are manipulated on a magnetic board to illustrate the story.

More effective, perhaps, have been those show segments which use television technology to endow a letter with seemingly magical life. In one such segment, Big Bird is left to guard a three-dimensional lower case "i." The dot on the "i," which appears to be three-dimensional like the body of the letter over which it is suspended, is in fact a matted disc manipulated by a puppeteer. As soon as Big Bird is left alone with his charge, the dot jumps down from its position. Big Bird, alarmed that he will be accused of failing his responsibility if the dot escapes, gives chase. The dot eludes him and eventually disappears over the fence. The dot eventually returns and Big Bird is redeemed. By endowing the dot on the "i" with a magical life of its own, the episode makes that distinctive feature highly memorable.

Personification of letter forms has been effectively achieved in ani-

mation. Two groups of films produced for "Sesame Street" use very different animation techniques to the same end: to endow the abstract symbol with life.

The first group of films employs a technique known as clay animation. Clay is molded in successive stages, each photographed on a single frame of motion picture film. When the film is projected, the clay appears to reform itself into a succession of shapes. In a typical piece of clay animation produced for "Sesame Street," a small blob separates itself from a larger narrator blob and forms into the letter "E." Next, from the clay "E" are rapidly produced two "G's," and the three letters are aligned to spell "EGG." A clay egg forms behind the word and hatches to produce a baby eagle. The word "EGG" changes to "EAGLE," and the eagle eats the word.

The second group of films uses conventional graphic animation to similar effect. These films, however, omit the presentation of whole words in print. Instead, the letter featured in each film transforms into objects or actions whose names illustrate the sound of the letter. The letter constantly reappears only to transform again. The transformations succeed one another continuously to the accompaniment of music, while a voice recites a dreamily poetic narrative full of alliteration of the letter sound.

The personification typified by these two groups of films so concretizes the letters as to blur the distinction between symbol and object. Some advisors had felt that such an approach was wrong, that it would be best always to emphasize the symbolic character of the letters. Others

felt that occasional concretization would not be harmful and could be useful as a means of dramatizing the instruction.

Personification is not the only technique employed to make letters the focus of dramatic action. A puppet sketch involving Bert and Ernie in a dispute over who has access to the cookie cabinet illustrates another.

Bert, in an effort to establish his exclusive right of access to the cabinet, has painted a capital "B" for Bert on the front doors of the cabinet. Ernie has noticed that the letter spans the division between doors. In apparently innocent elaboration, he establishes that the initial on the door designates the name of the person who is allowed to enter the cabinet for cookies, Bert impatiently confirms the rule. Ernie then matter-of-factly opens wide the right-hand cabinet door, removing from sight the bumps on the "B" and leaving a skinny but discriminable "E" for Ernie, and helps himself to a snack.

Involvement of the letter at the center of the dramatic action seems certain to enhance the success of the teaching material. When the letter is instrumentally involved in the plot of a segment, it cannot be ignored; to the extent that the segment is remembered, the letter is remembered. There have been segments used in "Sesame Street" in which the letter is not central to the plot. In those segments attention may be focused elsewhere and the letter as signal lost in the noice of the attractive context.

Another production technique calls attention to the characteristic

shape of a letter by direct instruction in the form of a comic lecture of hard-sell sales pitch. Many of the "Sesame Street" characters have been used from time to time in segments of this kind. Oscar's rantings on the subject of "P" and "R" is an example. Mr. Hooper delivers an extended and eloquent sales pitch in the manner of the slickest of used-car salesmen for a four-foot-high capital "J." A puppet named Professor Hastings, who verges on senility, gives a confused talk about the letter "Y," interrupted periodically for short naps. Use of character humor, comic exaggeration of style, and occasional introduction of accident or harrassment make palatable the direct delivery of the instructional message.

The character who has most consistently addressed himself to the viewer in direct lecture is Kermit, the saturnine frog puppet. Quoted below is a portion of the script for the first program of the "Sesame Street" series. The five-minute sequence illustrates the clustering for mutual reinforcement of a variety of contrasting materials all designed to teach the letter "W." Throughout the sequence the letter alone remains constant.

The two puppet segments include between them many of the strategies and techniques discussed in this section: the use of repetition with variation; alliteration; statements of the functional necessity of the letter in words; letter construction (or rather destruction); juxtaposing, in sequence, similar letters for discrimination; synesthetic description; and personification with dramatic involvement of the letter.

The second of the two segments also illustrates the kind of unfortunate

instructional mistake which can slip by everybody despite the most careful scrutiny. In the course of his struggle with the letter "W," Kermit lists a number of words that could not exist without "W." Among them is "wrestle." Of course, Kermit is correct, but none of the words was shown in print on the screen; and the truth of his statement was obscured by the more evident truth that the "W" is "wrestle" is profoundly silent. Fortunately, because the word is spoken in the middle of the list, it is easily overlooked. While some attentive adults caught the error, no child appeared to be confused by it. And anyway, you can't expect a frog to think of everything.

ANIMATED FILM: "WANDA THE WITCH"

KERMIT "W" LECTURE, PART I

(KERMIT ON BRICK WALL; NEXT TO HIM A SELF-STANDING LETTER "W")

Kermit: Hi, ya. My name is Kermit and Gordon has asked me to say a few words in behalf of the letter "W." Now this is a letter "W"; by the way, it is an easy letter to make... it's made with all straight lines. And you need a "W" to make such words as wash, woman, weeping willow...

(MONSTER COMES UP AND EATS SECTION OF "W" SO THAT "N" REMAINS)

Kermit: Uh, I'm sorry, there was some sort of mistake here. I thought I was supposed to talk about "W," but they sent me and "N" here instead. Now, uh, that's an "N," see, 3 lines: Zap! Zap! Zap! The "W," as I said before, has 4 lines. Anyway, the "N" is not a bad letter. And you need an "N" for nice; there's an "N" in nifty; there's a couple of them in nincompoop, and uh...

(MONSTER COMES UP AND EATS SECTION OF THE "N" SO THAT "V" REMAINS)

Kermit: As I was saying, the letter "V" is an OK letter. I mean, it's on the list of OK letters. "V" is for victory and very confused. And...

(MONSTER COMES UP AND EATS SECTION OF "V" SO THE "1" or "I" REMAINS)

Kermit: ...Now this is an "I," tilted, or it could be the number 1, but whatever it is, it's not what it was a couple of minutes ago... and some people will eat anything.

So I hope... I hope this has been an informative little talk on the letter "W," "V," "N" or whatever...

(MONSTER MAKES FOR KERMIT, AS IF TO EAT HIM)

Hey... cool it there fellow, hey... I think I hear your mother calling... (TO AUDIENCE) I'll see you again.

ANIMATED FILM: "WANDA THE WITCH"

VIDEO TAPE: "CAROL BURNETT WANDA TAG:

(CAROL BURNETT IN COSTUME ON THE SET OF HER SHOW)

Carol: Wowie! Wanda the Witch is weird!!!!

ANIMATED FILM: "W-WORM"

Worm: Good-day everyone. I am a worm. Worm begins with "W." It's really the only important thing that does, you know...

(LARGE WALRUS ENTERS)

except for, of course, walrus...

(WALRUS DUMPS PAIL OF WATER ON WORM)

and water.

KERMIT "W" LECTURE, PART II

(KERMIT ON WALL. NEXT TO HIM A SELF-STANDING LETTER "W")

Kermit: Hi, ya, again there. I think we got everything all straightened away here. And now I am ready to tell you about the letter "W." This, if you recall, is the letter "W." It's an easy letter to make if you're good at straight lines. Now the sound of "W" is in a number of useful and common words... words like wiggle...

(W WIGGLES)

Hum..., OK, anyhow, "W" is also the first letter in the word wobble...

(W WOBBLES)

...it's also in weird... umm. Anyhow, without the letter "W" we could not spell walk...

(W WALKS)

...we could also not spell wander...

(W WANDERS)

...we couldn't spell wait a minute... listen, you...

(W BEGINS TO ATTACK KERMIT)

...we couldn't spell watch it! Without the letter "W"
we couldn't spell wrestle...

(KERMIT AND W WRESLE)

and we couldn't spell wack, wack, wack, wack. We couldn't spell warning... listen! I warn you! We couldn't spell war; we couldn't spell winning... or weakening...

(W FORCES KERMIT DOWN BEHIND WALL)

and we couldn't spell woe is me...

SEQUENCING AND SCHEDULING

The problem of instructional sequence concerned the designers of "Sesame Street" from the very outset. No matter how effective the information campaign prior to going on the air, the audience, especially in the inner city, was bound to start relatively small and grow during the first three or four months of the series. Furthermore, it was certain that no matter how entertaining the show proved to be, a sizable percentage of the audience would view irregularly. Then too, members of this mercurial audience would differ widely in age, background and prior experience. For these reasons, the kind of sequencing possible with captive learners was ruled out. No single program could require of its audience that it had seen any other, nor could any program or program element designed exclusively to answer the needs of a single sub-group within the audience.

The nature of the broadcast situation imposed one further constraint. Instruction within each goal category had to be scheduled in such a way that a child tuning in the series late and viewing irregularly thereafter would still be guaranteed at least some exposure to the entire curriculum.

The solution to the second problem was obvious: each program would include instruction in as many goal areas as possible. However, because every show could not teach toward all the goals, a schedule of goal distribution was necessary. The schedule had to include as much review as possible for the sake of the irregular viewer who might miss the primary instruction, and the entire schedule had to recycle at least once for the benefit of the larger audience anticipated for the second half of the season.

Scheduling the letter instruction presented problems of its own. It was impossible to present the letter-related skills in strict accordance with any sensible assumptions about hierachical acquisition. For example, there was no point in teaching the short vowel sounds first if a sizeable portion of the ultimate audience might not be watching them.

There remained the possibility of assigning varying emphasis to the letters. This too proved an impossibility. Criteria for such an assignment conflicted with one another. Relative learnability and discriminability did not necessarily correspond either with frequency of occurrence in English or with frequency of occurrence in beginning readers. Moreover, the teaching strategies and production techniques available to television could themselves become major determinants of learnability. In sum, the number of variables affecting the learning of letters was so vast that equal emphasis on all letters seemed the best approach. The advisors and consultants urged, however, that heavier emphasis be given to the five principal vowels than to the consonants.

With these decisions made, design of the schedule of letter instruction was relatively easy. For the purposes of the schedule, the alphabet was regarded as a set of thirty-six letters: twenty-one consonants, five vowels, and the same five vowels repeated twice more. Three letters were introduced each week in random order, thus making it possible to present the entire set in a period of twelve weeks.

Within each week the schedule was intricate. On three of the five days the following pattern applied: one of the week's three letters was given major attention; the other two received minor attention for purposes

of review and reinforcement. Thus, over the three days, each letter was given primary emphasis once and secondary emphasis twice. On another day all three letters were given equal emphasis. On the fifth day, two of the previous week's letters were reviewed, and one letter from the following week was previewed, all three receiving equal time. These varying patterns were assigned to different days from week to week so that any child consistently missing the show on a particular day could still encounter all the variations within the schedule.

This twelve-week schedule was repeated once during the first twenty-six weeks of "Sesame Street." The pattern of letter instruction in the final two weeks of the season was left undetermined, allowing for experimentation with a different schedule or different ways of presenting the letters.

The limited possibilities for sequencing dictated to a large extent both the format of the entire show and the construction of segments within the show. Each program was conceived as a potpourri of short, diverse elements, frequently related to one another but often not, all held together by continual reference to the street setting and the live hosts. The diversity was designed, insofar as possible, to include something for everybody in the audience, regardless of age or experience. Thus, segments designed to instruct the three-year-old often served as entertaining diversions for the five-year-old. Conversely, that which instructed the five-year-old sought to entertain the three-year-old. In principle, any child could tune in any program and benefit from it in some way.

It was assumed that any given child at any given time would perceive the show in accordance with his capacity to understand , but that repeated

exposure to the program would expand that capacity. Individual program elements, therefore, were designed to embody within them a number of levels of complexity. Any given viewer could then perceive the material on the level of complexity appropriate to his level of understanding. And if certain assumptions about the effect of repetition were valid, a child could sequence himself up through the material presented, even though the entire series of programs could have been shown in reverse order.

Some assumptions inherent in this notion of "vertical sequencing" can be illustrated with reference to a hypothetical animated film designed to teach the shape of the letter "W," its name, and the sound it represents. Over a number of repetitions, any or all of the following concepts may be understood by the viewing child (in his own terms, of course):

1. That squiggle is familiar; that squiggle is not a random squiggle.
2. You make that squiggle like this.
3. If you are not careful when you make that squiggle, you will make another squiggle that looks like it but is not the same.
4. That squiggle is called "double-U."
5. "Double-U" is one of a class of squiggles called "letters."
6. So are some of the other squiggles you may make if you are not careful making "double-U."
7. The letter "W" represents a speech sound.
8. The letter "W" often appears with other letters in groups called "words."

9. Spoken words are made up of different speech sounds.

10. Many spoken words begin with the speech sound /w/.

11. The letter "W" represents the speech sound /w/.

12. Printed words correspond to spoken words.

13. In printed words, "begins with" means "at the left-hand end of."

14. When a printed word begins with "W," /w/ is the first speech sound in the spoken word to which the printed word corresponds.

15. The printed word "WITCH" is such a word.

This list of concepts is, of course, incomplete, and is not intended to represent a taxonomy of letter learning.

Acquisition of the concepts need not follow the sequence given, now indeed need they be acquired individually. A number of variations in the pattern of learning may occur, for a number of reasons. A child may swim in confusion through many repetitions of a film and then, in a moment of illumination, vault to a sudden intuition of several concepts, simultaneously. Another child may proceed steadily to acquire concept after concept in some orderly pattern until some new way of understanding "W" appears to conflict with what he has learned earlier. The apparent conflict may lead him to question the earlier learning and cause him to regress temporarily to a level of understanding below his previous achievement. But, given enough subsequent repetitions, this same child will return to the point of confusion, integrate the new understanding with the old, and move on.

Previous letter learning may alter the order and rate of acquisition, and not always favorably. The location of points of confusion may vary

depending on how many letters the child has already learned and how well he has learned them. The child's degree of visual literacy will similarly affect his learning.

However, short the duration of the film, it has a horizontal sequence of entertainment and character development. The child's experience of this horizontal sequence also interacts with his experience of the vertical conceptual sequencing. At any point in the horizontal sequence the child's attention may be fixated by something visually or aurally amusing, distracting, disturbing or confusing. Fixations of this kind can be productive if the entertainment technique and the educational intent coincide at the point of fixation. The episode of Big Bird and the dot on the "i" is an example. The child who fixates on the magical behavior of the disappearing dot will have no difficulty remembering the distinctive feature of "i."

While the foregoing discussion reflects accurately the deliberate attempt of the producers to provide for vertical sequencing, the discussion itself is more theoretical than operational. In actual practice, the show elements were made by show people, whose intuitions were as enlightened as an earnest group of advisors could manage, but whose ultimate concerns were simultaneously to teach and to entertain, and always to entertain.

THE PROGRESS TESTING

As described earlier in connection with the CTW operational model, there are two major research efforts associated with the project: (1) The formative phase, designed to provide information which could be useful for helping to evolve instructional approaches during the developmental stages of planning and production; (2) the independently conducted summative phase, designed to test the extent to which the instructional objectives may have been accomplished. One part of the formative research has been to progress-testing program, which has involved systematic testing of viewers and non-viewers at periodic intervals into the six-month broadcast season. Some results from this preliminary testing will be shown here as a way of suggesting the progress of the program toward the achievement of its goals. Consistent with the special emphasis upon letters in the other sections of the report, this presentation will be restricted to the results which pertain to naming of letters.

A combined total of 200 children from day-care centers in Maine, New York, and Nashville were randomly divided into two groups, one including 100 viewers and the other 100 non-viewers. All the children, predominantly four- and five-year-olds from low-income homes, were pretested. A third of the viewers and a third of the non-viewers were retested three weeks into the broadcast period, the same third and a new third of both viewers and non-viewers after six weeks, and all the viewers and non-viewers again after three months. The measures included eight tests developed expressly for CTW by Educational Testing Service of Princeton,

New Jersey, and used by them as a part of the program of summative evaluation. At each testing time, the battery was administered to individual children over successive daily sessions requiring a total of about an hour and a half of testing time per child.

A full report of the results of this progress testing will become available later, as a part of the comprehensive final report over the project's first experimental season. That comprehensive report will also include the results of the major program of summative research and evaluation being carried out by Educational Testing Service, and as such will reflect (1) a broader sampling, including three-year-olds as well as four- and five-year-olds, children in their own homes as well as children in day-care centers, children in rural as well as urban settings, and Spanish- as well as English-speaking children; and (2) a viewing period of six months, as contrasted with the three-month period for the results to be reported here.

Consistent with the very limited illustrative intent indicated earlier, no highly detailed description of the research methods and procedures will accompany the data mentioned here. However, some interpretive considerations seem essential. First, because the results are tentative, based upon only a portion of the entire experimental season, and because they are primarily to be used for formative purposes, no statistical analyses will be performed, either now or later (although significance tests, quite appropriately, will be performed on the results of the summative research and evaluation).

Secondly, it is important to note that each classroom included some

viewers and some non-viewers, and that they were placed in separate classrooms for the hour each day when the show was being telecast. The teachers all agreed to provide the non-viewers with no systematic instruction in the program's main goal areas during the daily, hour-long period when the viewers were watching the program, although they were free to offer instruction in these areas at other times of the day, to viewers and non-viewers alike, where it had been their custom to do so during previous years. We know that there was some occasional "contamination" of the experiment, due to viewing by "non-viewers," as when they were at home ill, at home for the Christmas recess, or at home during a late afternoon or week-end showing (although sites were selected so as to minimize such possibilities); and, also due to non-viewing by "viewers," as when <u>they</u> were home ill. These viewing irregularities would tend to attenuate the differences in tested gains between viewers and non-viewers.

There are numerous other factors which bear upon an adequate interpretation of the results. First, only three months of the six-month experimental broadcast season had gone by at the time of post-testing, so that no effects due to improved approaches which may have been incorporated into the last half of the program are reflected here.

Secondly, for efficiency and convenience, the sample for this phase of the research was drawn exclusively from day-care centers. As a result, while the children are primarily from low-income homes, they are not representative of the disadvantaged population. Moreover, there are several factors which could limit the validity of generalizing the results to the case of children viewing in their own homes. For example, there

are selection factors underlying the fact that the children are enrolled in day-care programs; there is the possibility that viewers and non-viewers benefit disproportionately from related classroom instruction; and there is the possibility that viewing in groups could either enhance or depress the effect of the televised instruction. Fortunately, the larger study being carried out independently by Educational Testing Service for the more express purposes of summative evaluation, when available, will systematically involve many experimental categories, or variables, which are not represented here because of the more limited formative purposes for which this study was conducted.

Figure 3 shows the results on the 24-item Letter Naming subtest. A total of 67 four-year-olds and 101 five-year-olds are represented, with very nearly equal numbers of viewers and non-viewers included at each of these two age levels. The results show the average proportion of viewers or non-viewers passing each item at pretesting and at post-testing, along with the percentage gain.

For the 24 letters making up the subtest, the average percentage correctly named at pretest by the four-year-old viewers and non-viewers combined was 15 per cent. By three months, the viewers had progressed to an average of 43 per cent passed, and the non-viewers to 23 per cent. For the five-year-olds, viewers and non-viewers combined, 31 per cent of the items were passed on the average at pretest. By three months, the viewers passed an average of 62 per cent, and the non-viewers, 48 per cent. Accordingly, the average percentage gain for the four-year-old viewers is 25 per cent, and for he five-year-old viewers, 30 per cent. If these results are borne out in the results of the summative

evaluation, and it seems likely that they could be even more dramatic there due to the fact that an instructional period of twice the duration will be involved, it will indicate that the program is effective at both age levels. The summative testing will also yield data concerning the impact on three-year-olds.

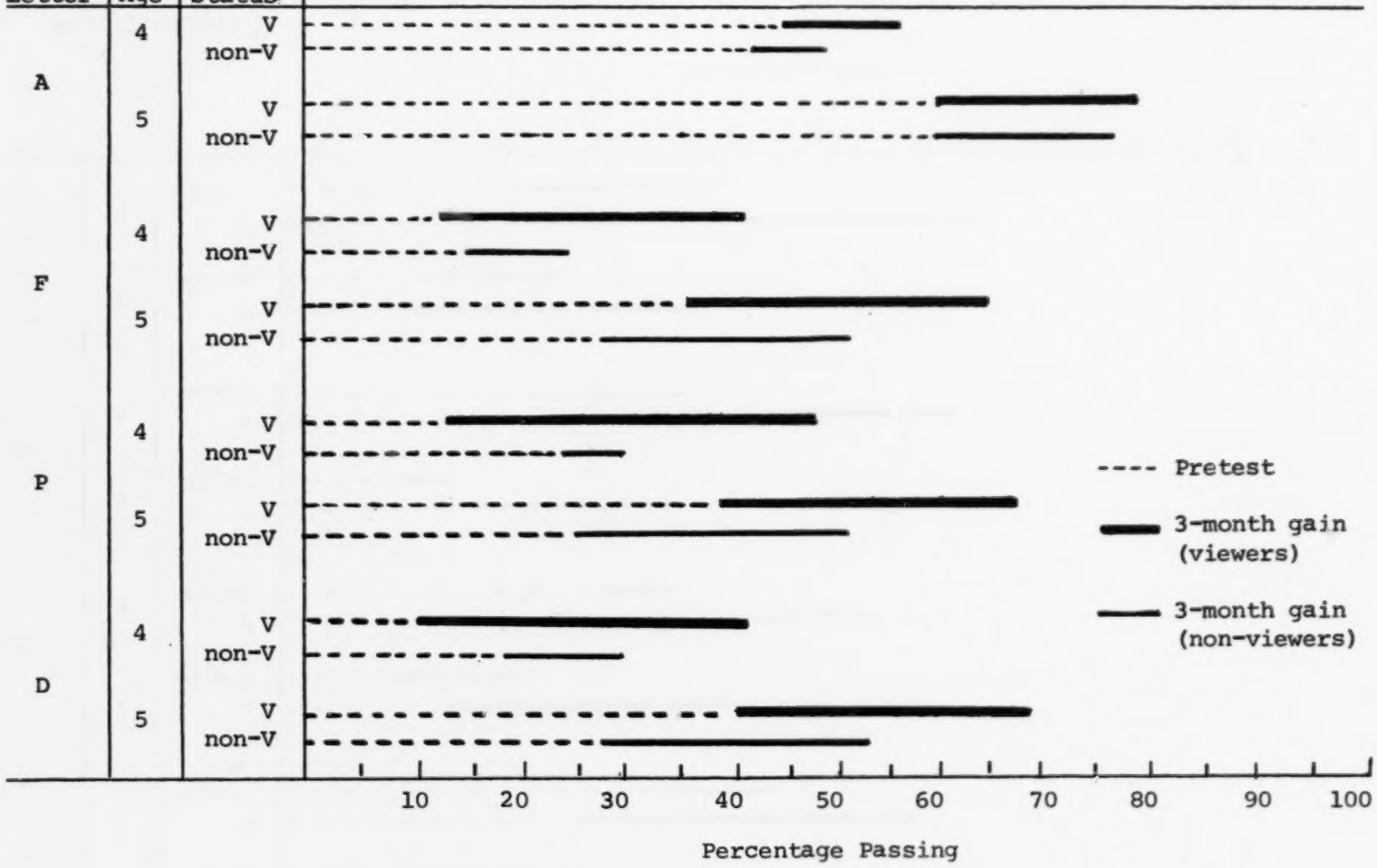


Fig. 3.—Three-month percentage Gains in Letter-Naming for Day-Care Viewers and Non-Viewers.

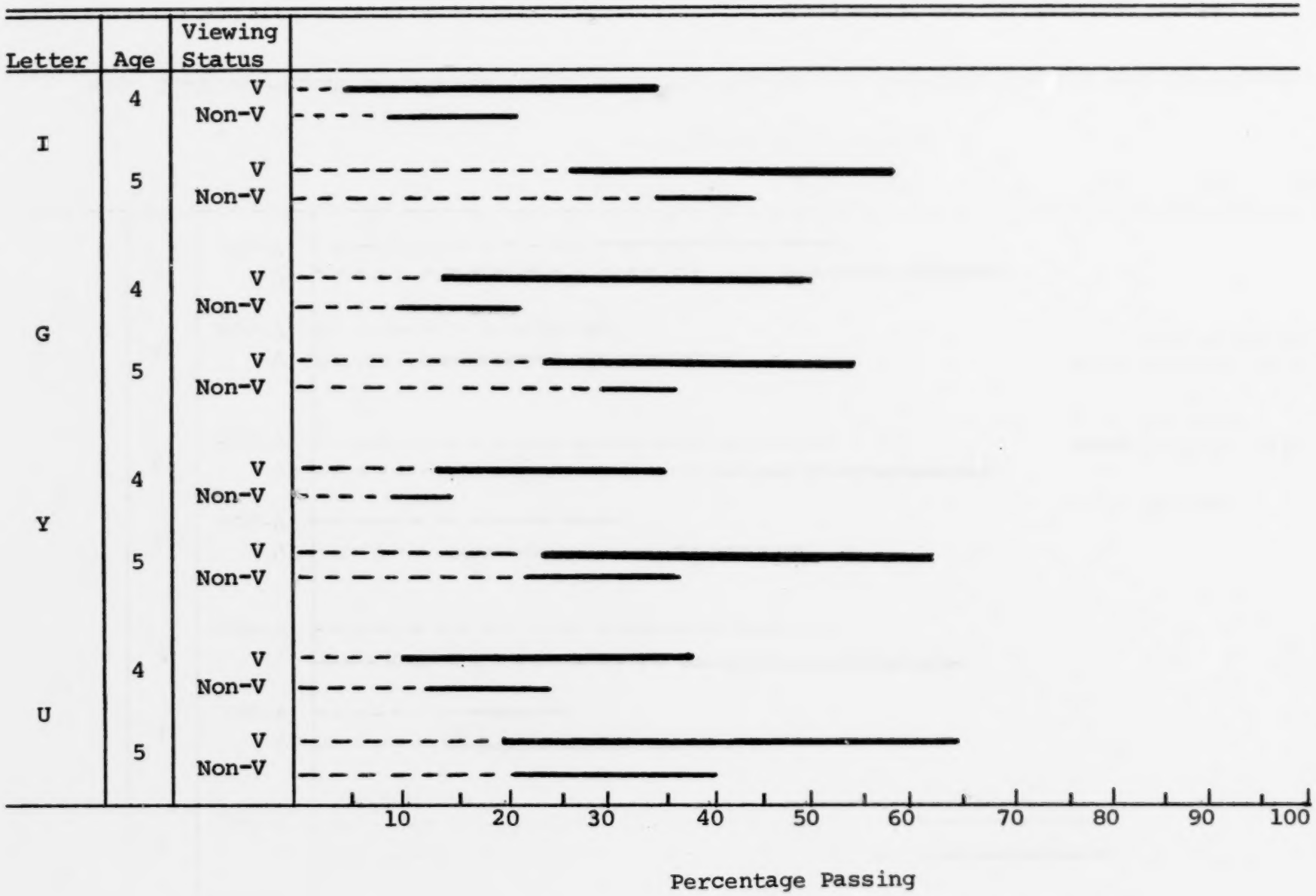

Letter
Age
Viewing Status
I
4
V
Non-V
5
V
Non-V
G
4
V
Non-V
5
V
Non-V
Y
4
V
Non-V
5
V
Non-V
U
4
V
Non-V
5
V
Non-V
10
20
30
40
50
60
70
80
90
100
Percentage Passing

Fig. 3.—(Cont.)

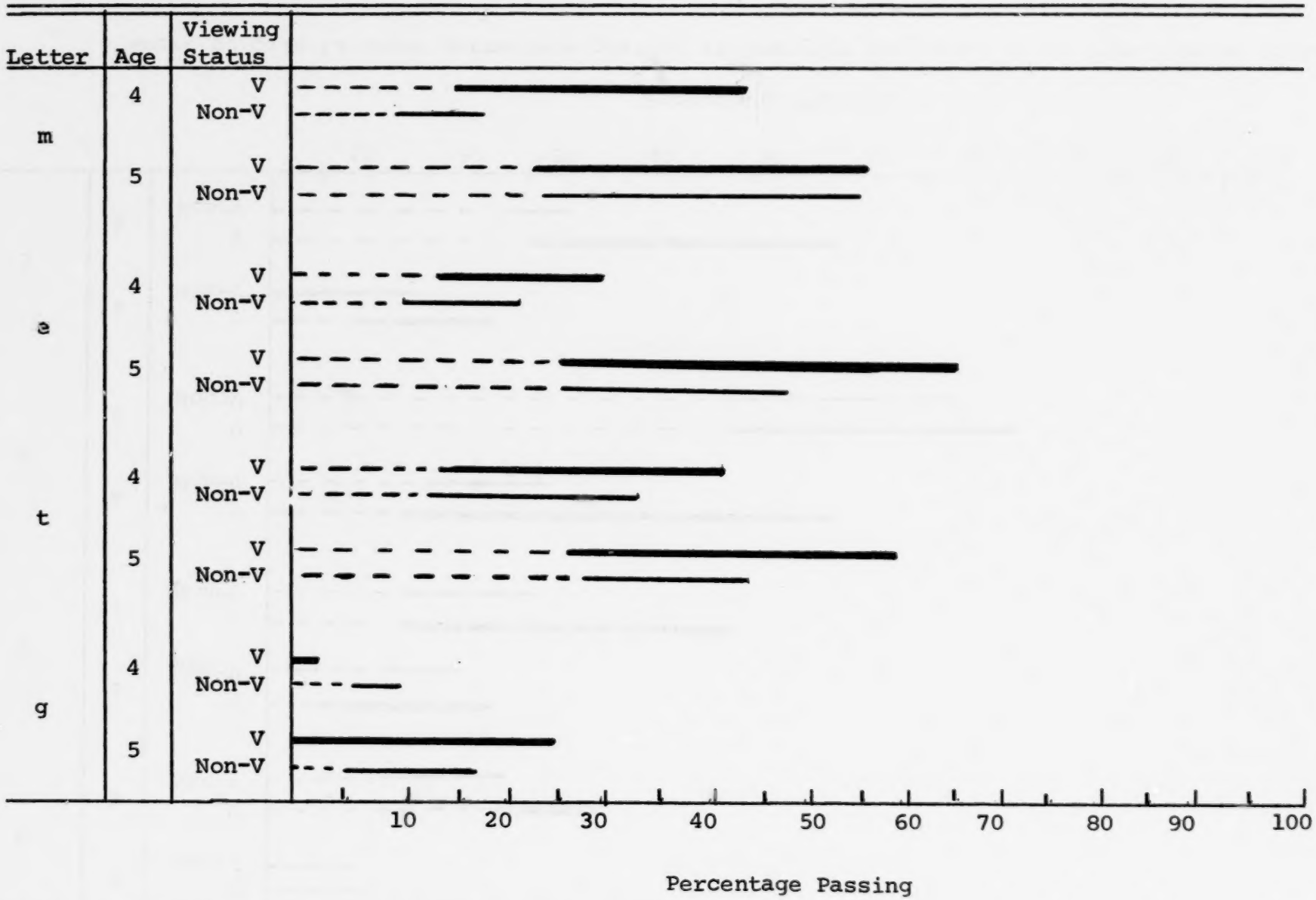
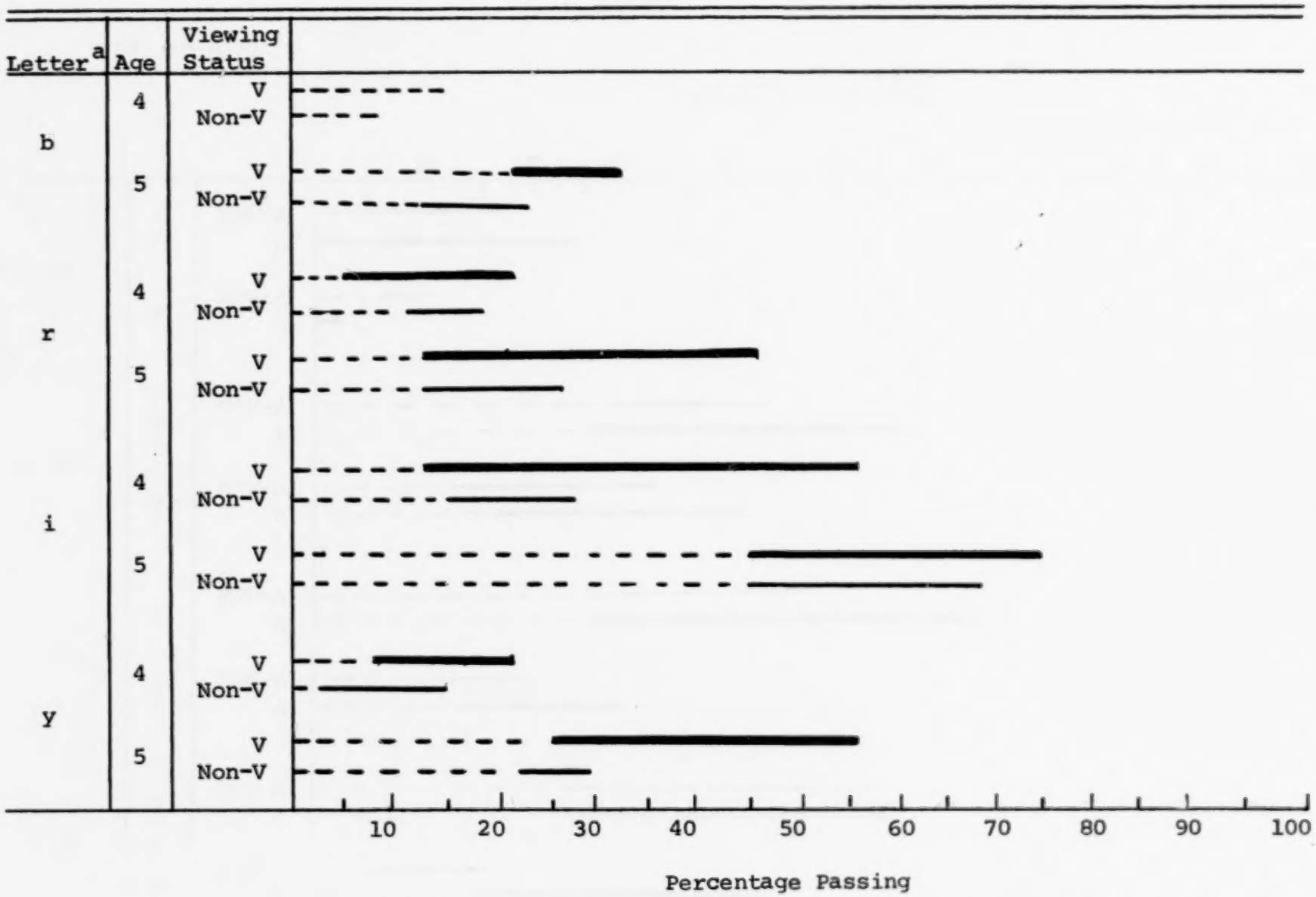

Letter
Age
Viewing Status
m
4
V
Non-V
5
V
Non-V
e
4
V
Non-V
5
V
Non-V
t
4
V
Non-V
5
V
Non-V
g
4
V
Non-V
5
V
Non-V
10
20
30
40
50
60
70
80
90
100
Percentage Passing

Fig. 3.—(Cont.)



[a]Where no gain is shown percentage passing at 3-months was equal to or less than at pretest.

Fig. 3.—(Cont.)

Letter	Age	Viewing Status
O	4	V
		Non-V
	5	V
		Non-V
R	4	V
		Non-V
	5	V
		Non-V
B	4	V
		Non-V
	5	V
		Non-V
E	4	V
		Non-V
	5	V
		Non-V

10 20 30 40 50 60 70 80 90 100

Percentage Passing

Fig. 3.—(Cont.)

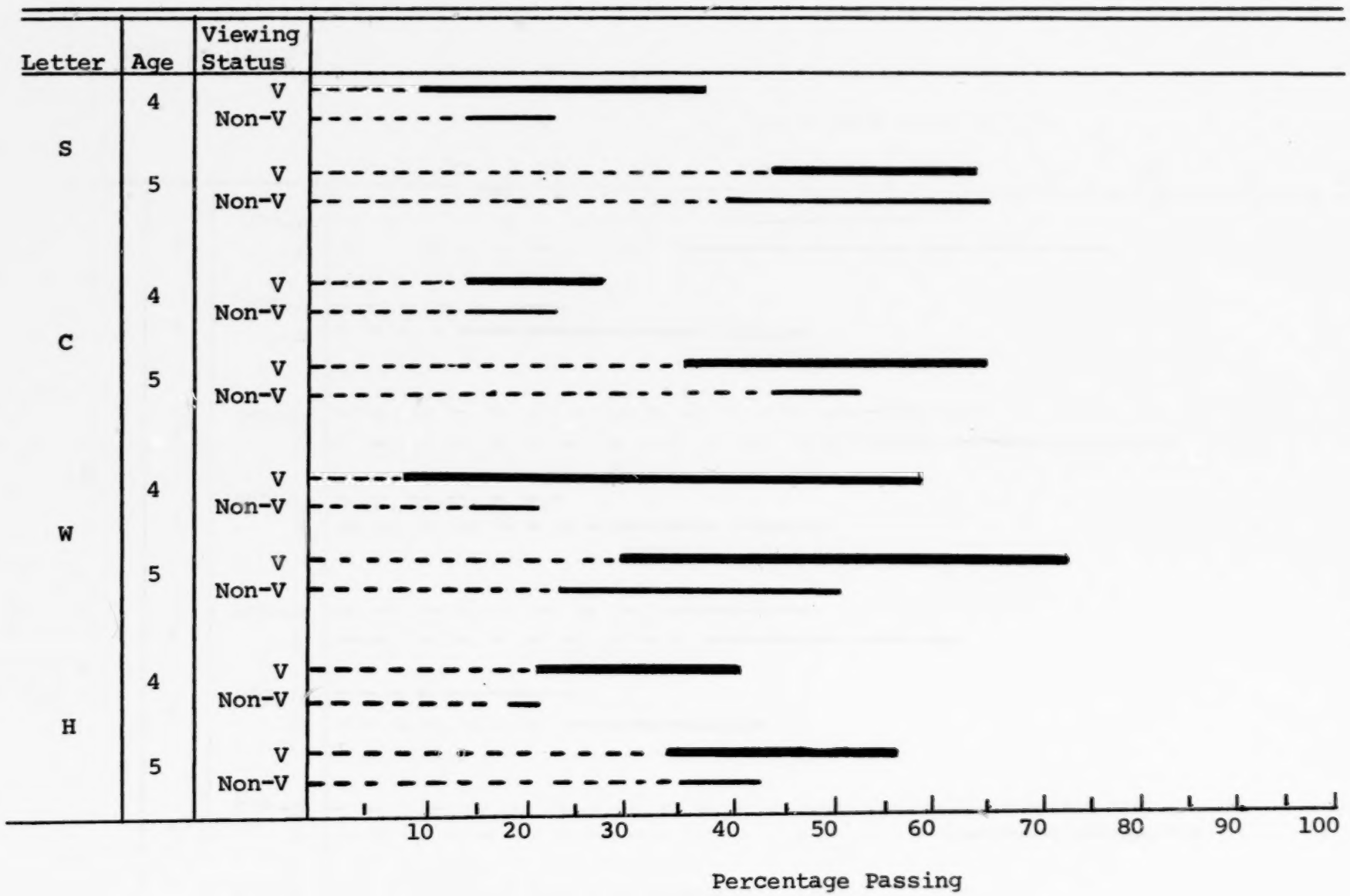

Letter
Age
Viewing Status
S
C
W
H
4
5
V
Non-V
10
20
30
40
50
60
70
80
90
100
Percentage Passing

Fig. 3.—(Cont.)

The possibilities for interpreting relative gains made on the various letters are limited. However, it may be interesting to look at the amount of improvement in naming the letter "W," especially in light of the ways in which this letter was treated in the productions. The reader is referred to the earlier section on production implementation for a discussion of the instructional strategies and production devices employed in treating this letter.

When considering the results as summative data, there is no way to rule out the presence of other factors which could have contributed to the magnitude of apparent gains in naming this letter. However, viewed as formative data, the results are sufficiently dramatic to warrant a search for special production techniques which could have brought them about, and which could be adapted to teaching of other letters. This general approach to the evolution of effective production techniques has been employed, in fact, throughout the formative phase of research and evaluation. A more thorough treatment of the results of the formative research, along with the results from the summative evaluation, will be available later in a comprehensive report over the first experimental season.

SUMMARY

Television technology offers unique capabilities for framing instruction, motivating the thinking and learning process, and effecting efficient delivery of the instructional package. The Children's Television Workshop has developed an operational model for exploiting these capabilities and has applied it in the planning and production of "Sesame Street." Early test results suggest a significant instructional impact.

The CTW operational model features a unique collaboration of educational researchers, academic advisors, and television producers. The success of the model recommends its use in other similar ventures.

The activities represented in the model and the order in which they have been carried out are as follows: curriculum development, behavioral statement of selected goals, measurement of the existing competence range among the target audience, measurement of existing film and television material for audience appeal, production of experimental program segments, testing of experimental segments for audience appeal and educational impact, production of the broadcast series, and summative evaluation of the entire experiment.

Considerations affecting the selection of curriculum goals for "Sesame Street" included the needs and abilities of the target children, the expectations of parents and teachers, and the characteristics of broadcast television. The language and pre-reading goals finally selected for the program's first experimental season fall into the following areas: development of perceptual skills contributing to subsequent success in

decoding of print; development of concepts and vocabulary useful later in reading comprehension; enjoyment of language and other forms of reading motivation; development of self-concept and encouragement of parental approval and involvement; and development of certain specified abilities relating to naming and recognizing letters and to establishing letter/sound correspondence.

"Sesame Street" has employed a variety of teaching strategies and production techniques in implementing these letter goals. Use of humor and incongruity presumably encourages language play and has attentional and motivational advantages. Frequent exact repetition of short program elements, in the manner of commercial advertising, promotes reinforcement of learning through rehearsal away from the viewing circumstance and enhances the child's ability to assimilate the instruction. Repetition with variation either of format or content is thought to promote generalization of learning and a literacy in certain auditory and visual conventions constituting special strategic and structural learning sets. Overt verbal participation, often a product of repetition, contributes to learning reinforcement and can eventuate in overt imitation and sometimes overt anticipation of instruction repeated exactly. The observed development through which simultaneous imitation becomes anticipation leads to the rather remarkable conclusion that self-programmed individualization of learning is a feasible feature of one-way televised instruction.

Letter/sound correspondences have been taught by the use of comically exaggerated alliteration which presumably permits the viewer to infer the rule of correspondence. The distinctive features of letter shapes have

been shown through the use of analysis and synthesis: by drawing the letter in various ways, by assembling the letter in various ways, by relating letter forms to analogous shapes of real objects, by discovering embedded letter forms in the environment, by juxtaposing confusable letters, by reinforcing visual experience of letter forms with synesthetic description, by personifying and concretizing letters, and by involving letters at the focus of dramatic action. Many show elements have used combinations of these strategies and techniques.

Sensible sequencing of instruction in the usual classroom sense is not possible, given the irregularity with which children view broadcast television. The effect of sequencing can occur, however, when successive levels of skill or understanding are produced by the exact repetition of segments containing multiple levels of instruction.

ADDENDUM

Statement of Instructional Goals for the 1970-71 Experimental Season of Sesame Street[a]

[a] The goals stated here were distilled from an extensive series of seminars involving the staff, and the advisors and consultants of the Children's Television Workshop.

Statement of Instructional Goals for the 1970-71 Experimental Season of Sesame Street

I. Symbolic Representation

A. Pre-Reading Goals

1. Letters

* a. Matching - Given a printed letter the child can select the identical letter from a set of printed letters.

* b. Recognition - Given the verbal label for a letter the child can select the appropriate letter from a set of printed letters.

* c. Labelling - Given a printed letter the child can provide the verbal label.

d. Letter Sounds

1. For sustaining consonants (f,l,m,n,r,s,v), given the printed letter the child can produce that letter's corresponding sound.

2. Given a set of words presented orally all beginning with the same letter sound, the child can select the letter associated with the sound from a set of printed letters.

3. Given a set of words presented orally, all beginning with the same letter sound, the child can select another word with the same initial letter sound from a set of words.

* e. Recitation of the Alphabet - the child can recite the alphabet.

2. Words

* a. Matching - Given a printed word the child can select an identical word from a set of printed words.

b. Boundaries of a word - Given a printed sentence the child can correctly point to each word in the sentence.

c. Temporal-Sequence/Spatial-Sequence Correspondence (Words and Sentences are read from left to right).

1. Given a printed word the child can point to the first and last letter.

2. Given a printed sentence the child can point to the first word and the last word.

* d. Decoding - Given the first five words on the reading vocabulary list (ran, set, big, mop, fun), the child can decode other related words generated by substitution of a new initial consonant. (ex. given the word "ran" the child can decode "man" and "can").

e. Word Recognition - For any of the words on the Sesame Street Word List, the child can recognize the given word when it is presented in a variety of contexts.

* f. Reading - The child can read each of the 20 words on the Sesame Street Word List.

Sesame Street Word List

1.	ran	11.	is
2.	set	12.	love
3.	big	13.	me
4.	mop	14.	school
5.	fun	15.	stop
6.	bird	16.	street
7.	bus	17.	telephone
8.	danger	18.	the
9.	exit	19.	walk
10.	I	20.	you

* g. Spanish-English Vocabulary (to be determined)

B. Numbers Goals

* 1. Numbers 1-20

* a. Matching - Given a printed numeral the child can select the identical numeral from a set of printed numerals.

* b. Recognition - Given the verbal label for a numeral the child can select the appropriate numeral from a set of printed numerals.

* c. Labelling - Given a printed numeral the child can provide the verbal label.

* d. Recitation

* 1. The child can recite the numbers from 1 to 20.

* 2. Given a starting point under ten the child can count from that number to any given higher number up to ten (ex. count from 3 to 8).

2. Numerical Operations

a. Enumeration - The child can define a set or subset of up to 10 objects from a larger set.

ex. 1 "Here are some pennies. How many are there?"

ex. 2 "Here are some pennies. Take two."

* 1. The child can recognize that the last number reached in counting is the total number in the set: ex. "Count the pennies. How many are there?"

2. The child can make use of counting strategies (ex. when counting objects arranged in a circle the child will identify the first object counted by marking it, moving it or noting a distinguishing characteristic of that object.)

b. Equality - The child can perform the appropriate operations needed to balance an equation.

1. Conservation of Number - The child can match sets of equal number regardless of configuration (ex. 000 = 0).
0 0

* 2. Numeral/Number Correspondence - The child can assign the correct numeral to sets of differing numbers (ex. 000 goes with the numeral "3").

* c. Addition & Subtraction - The child can add or subtract 1 or more objects from any group of less than 10 objects.

* C. Geometric Forms (circle, square, triangle, rectangle).

* 1. Labelling - Given a drawing, cut-out or object in the shape of a circle, square, triangle or rectangle, the child can provide a verbal label for that shape.

* 2. Recognition - Given the verbal label "circle," "square," "triangle" or "rectangle," the child can select the appropriate drawing, cut-out or object from a set.

II. Cognitive Organization

A. Perceptual Discrimination and Orientation

1. Visual Discrimination

   a. Matching - The child can match a given object or picture to one of a varied set of objects or pictures which is similar in form, size or position.

   b. Recognition of Embedded Figures - Given a form the child can find its counterpart embedded in a picture or drawing.

   * c. Part/Whole Relationships - The child can structure parts into a meaningful whole:

      1. Given a model and a selection of parts the child can select those parts which are essential to the construction of the model.

      2. Given a model and an assortment of its parts, the child can arrange these parts to match the model.

2. Auditory Discrimination

   a. Sound Identification - The child can associate given sounds with familiar objects or animals.

   b. Copying Rhythms - The child can copy a rhythmic pattern (a by-product of this goal will be the promotion of physical activity on the part of the viewers).

   c. Rhyming Words - Given two or more words that rhyme, the child can select or supply a third rhyming word.

3. Subjective/Objective Discrimination - The child can distinguish between the objective (indisputable) properties of an object and the subjective (judgmental) properties which he ascribes to the object.

* B. Relational Concepts - The child can demonstrate his understanding of various relational concepts.

   * 1. Same/Different - This concept underlies all of the following relational concept categories.

   * 2. Size Relationships - Big/Bigger/Biggest; Small/Smaller/Smallest; Short/Tall.

   * 3. Quantitative Relationships - None, Some, More, Most, All, Less.

   * 4. Positional Relationships - Under, Over, On, Through, Around, Next To, First, Last, Up, Down, Beginning, End.

   * 5. Distance Relationships - Near, Far, Close To, Away From.

* 6. Temporal Relationships - First, Last, Before, After, Next, Beginning, End.

* C. Classification

* 1. Sorting (Which of these things is not like the others?) Given a group of objects several of which have an attribute in common, the child can sort out the inappropriate object on the basis of:

a. size
b. form
c. function
d. class
e. quantity

* 2. Classifying (Which of these things belongs with these?) Given at least two objects that define the basis of grouping, the child can select an additional object or objects that belong in the same group on the basis of:

a. size
b. form
c. function
d. class
e. quantity

* 3. Multiple Classification

* a. Property Identification - Given any object the child can name at least two properties of that object. Ex. "The ball is round and red."

* b. Multiple Class Inclusion and Differentiation - Given any two objects the child can recognize that they are alike on one dimension and different on another. Ex. "Both of these things are round but one is red and one is blue."

* c. Multiple Classification and Regrouping - Given any group of objects the child can:

* 1. Classify them on the basis of more than one characteristic. Ex. Given a set of red and blue circles and squares the child can divide the set into 4 subsets: a. red circles b. red squares c. blue circles d. blue squares.

* 2. Classify them on the basis of one characteristic (ex. color) and then reclassify the same objects on the basis of another characteristic (ex. shape). (The point will be made that there is often no single right answer.)

III. Reasoning and Problem Solving

A. Making Inferences

1. Inferring Antecedent Events - The child can suggest events

2. Inferring Consequent Events - The child can predict future outcomes that may result from a situation.

B. Generating Explanations and Solutions - Given a familiar problem, the child can provide adequate explanations and solutions to that problem.

C. Evaluating Explanations and Solutions - Given several possible explanations or solutions to a problem the child can evaluate these solutions in reality (trial and error) or in his mind (pretesting). When presented with alternative solutions he can select the best one.

IV. The Child and His World

A. Self

* 1. The Mind and Its Powers - The child is aware of his mental powers. He understands that his brain has the capacity to:

a. Pretest Solutions
b. Remember
c. Imagine
d. Plan
e. Guess from progressively revealed clues.

2. Body Parts and Functions - The child can identify, label and state or recognize the function of such body parts as the:

a. head
b. nose
c. ear
d. eye
e. tongue
f. arm
g. elbow
h. hand
i. finger
j. leg
k. knee
l. foot

* 3. Audience Participation - The child will respond overtly to those sections of Sesame Street designed to elicit active participation.

4. Emotions - The child can recognize and label such emotions as:

a. fear
b. happiness
c. sadness
d. anger
e. surprise
f. pride

B. Social Units

1. Roles and Functions - Given the name of certain roles in the family and in the community the child can describe appropriate responsibilities associated with those roles.

ex. The child can name one or more principal functions of a father, mother, policeman, mailman, farmer, baker, fireman, doctor, dentist etc.

2. Social Groups and Institutions

a. The Family and the Home

1. The child recognizes that various types of structures all serve as homes.

2. The child recognizes the family as a unit and can describe several types of family activities.

b. The Neighborhood - The child is familiar with the social and physical boundaries of his own neighborhood.

c. The City or Town - The child recognizes various structures, spaces, and points of interest which make up the city or town.

ex. 1. The child is familiar with the concepts of a zoo, park , playground, airport etc. and with stores where various types of common items may be purchased.

ex. 2. The child understands that there are many different cities, that they have finite boundaries, that various goods or products must be transported in and out, and that various modes of transportation are employed.

ex. 3. The child identifies the respective functions of such institutions as the school, post office, and hospital.

C. Social Interactions

* 1. Differing Perspectives

* a. The child realizes that different individuals or groups may have different reactions in similar situations.

* b. The child demonstrates that he is aware of and values the feelings, preferences and modes of behavior of other individuals and groups.

* 2. Cooperation - The child recognizes that in certain situations it is beneficial for two or more individuals to work together toward a common goal.

* a. Division of Labor - When a child is a member of a group that has a common goal, he realizes that the goal will be more easily achieved if each member of the group shares in the work or planning.

* b. Combining of Skills - When a child is a member of a group that has a common goal, he realizes that the goal will be most easily accomplished if each member of the group contributes his own unique or special skill.

* c. Reciprocity - The child realizes that in certain situations, in order to accomplish his goal, he must request the assistance of others and in turn assist them in accomplishing their goals.

* 3. Conflict Resolution - The child can provide adequate resolutions to conflict when he is presented with a familiar conflict situation.

D. The Man-Made Environment - The child is generally familiar with the form and functions of:

1. Machines and tools.

2. Buildings and other structures.

E. The Natural Environment - The child has a general awareness of the characteristics of:

1. Land, sky and water.

2. City and country.

3. Plants and animals.

4. Natural process and cycles.